

Universal

PRODUCTS

for Concrete Construction

UNIVERSAL FORM CLAMP CO. CHICAGO

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Universal

FORM CLAMPING AND TYING DEVICES ACCESSORIES FOR REINFORCED CONCRETE BUILDING SPECIALTIES

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UNIVERSAL FORM CLAMP COMPANY

General Offices and Factory: 972 MONTANA STREET, CHICAGO, ILLINOIS

Branch Offices:

NEW YORK, N. Y.

ATLANTA, GEORGIA

CLEVELAND HEIGHTS, OHIO

HOUSTON, TEXAS

General Information

STOCKS

A complete stock of standard items is carried at all times in our Chicago and New York Plants. A representative stock of materials is also carried by our branches at Houston and Atlanta. Distributors located in principal cities throughout the United States carry a stock of all standard items.

With stocks at all of these points we give dependable, fast service and at the same time considerably reduce transportation costs.

Stock Materials

Catalogue numbers have been assigned to all stock materials of Form Clamping and Tying Devices as well as Building Specialties. Code letters have been assigned to all stock materials of Reinforcing Accessories. The use of the catalogue numbers and code letters will materially simplify ordering.

Materials Fabricated to Order

Instructions for ordering Threaded Rods, Twisties, Brick and Stone Anchors, Hanging Devices and Reinforcing Accessories are shown in the descriptive data of each item.

SERVICE

Shipments of standard materials are made within twenty-four hours after receipt of order. The use of catalogue numbers and code letters will expedite the handling of orders.

Materials fabricated to order are normally shipped forty-eight hours after receipt of the order. In cases of emergency, orders will be shipped the day they are received.

Our plants at Chicago and New York operate complete fabricating units so that material can be shipped from either point thereby assuring prompt handling of all orders.

Special Items

UNIVERSAL is equipped to manufacture special items of almost any description for use with all types of concrete construction. When requesting quotations give complete specifications, quantities and time allowed for shipment.

Materials and Inspection

The high quality of our products is maintained by physical and chemical tests conducted by the Robert W. Hunt Company of Chicago.

THREADED TIE RODS

UNIVERSAL is equipped to furnish from stock $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{5}{8}$ " threaded tie rods made from high tensile cold drawn steel. All rods are cut to accurate lengths and are accurately threaded.

UNIVERSAL's high speed equipment permits prompt shipment of threaded tie rods in any quantities. Standard lengths of threaded tie rods are carried in stock. Normal quantities of special lengths of threaded tie rods are shipped the day after the order is received.

Threaded Tie Rods made from UNIVERSAL's

high tensile cold drawn steel permit a wide spacing of ties along the wales, as well as a wide spacing of the wales. These two advantages lessen the amount of lumber required for wales, lessen the number of holes required through the sheathing, lessen the number of holes to be grouted on the face of the finished concrete, reduce the number of tie rods and assemblies required . . . all of which makes the use of UNIVERSAL's Assemblies with the high tensile threaded tie rods more economical than other types of form tying devices.

Economy

Economy in concrete wall form construction is increasingly important. Advances in the cost of materials and wages of workmen make it necessary for contractors to take advantage of every saving possible. Proper selection of form ties and form lumber in accordance with the requirements of the job will often result in a saving of 2c to 4c per contact foot of forms, which translated into terms of dollars per yard of concrete may mean as much as \$5.00.

Form Design Tables, developed by UNIVERSAL

from data obtained under actual field conditions, are a ready aid in the design of the most economical forming systems.

From these tables the proper spacings of studs, wales and ties, as well as the unit loads per tie are determined.

The value of these tables is well established. They are accepted as a standard for form design by most of the construction engineers and contractors. For a more thorough discussion and explanation of these tables see pages 20 and 21.

Engineering Service

UNIVERSAL will, without obligation, prepare estimates and make recommendations from plans, sketches and information forwarded to us.

UNIVERSAL, through many years of experience, has encountered practically every forming problem and is, therefore, in a position to recommend the proper ties and form system for all types of concrete construction.

UNIVERSAL's recommendations give careful consideration to job conditions, localities, transporta-

tion facilities, as well as to economy and adaptable materials.

To expedite our estimates and recommendations the following information is required:

Rate of Pour: Maximum vertical lift per hour.

Form Materials to be used, if known.

Will concrete be mechanically vibrated?

Required distance, if any, tie must be cut back from the face of the concrete.

Approximate area to be formed at one time.

Length of time the forms must be left in place.

Form Ties

UNIVERSAL manufactures all types of form ties. Among these are form ties that can be removed from the wall, broken back a specified distance

from the face of the concrete, cut off flush with the face of the concrete, or to meet special job conditions.

Classification of Form Ties

The Classification of the Form Ties as shown below permits the contractor to select the tie that has a recommended working load which will meet

job conditions and at the same time develop the full allowable working load of the form lumber he proposes to use.

Recommended Working Loads of Form Ties

*Using Plain Round Mild Steel Rods

†Using High Tensile Cold Drawn Threaded Rods

	PAGE		PAGE
1,500 lb. Ties		9,000 lb. Ties	
*1/4" Form Clamps.....	12-13	†1/2" SPIROLOCS	4-7
Band Iron with Band Clamps.....	18	†1/2" Assembly for Cone Nuts.....	8-9
3,000 lb. Ties		Over 9,000 lb. Ties	
TWISTYES	10-11	†5/8" SPIROLOCS—14,000 lbs.	4-7
*3/8" Form Clamps.....	12-13	†3/4" SPIROLOCS—20,000 lbs.	4-7
5,000 lb. Ties		†7/8" SPIROLOCS—25,000 lbs.	4-7
†3/8" SPIROLOCS	4-7	†1" SPIROLOCS—30,000 lbs.	4-7
*1/2" Form Clamps.....	12-13		

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

A 5,000 lb. Tie using $\frac{3}{8}$ "
Cold Drawn Tie Rods
A 9,000 lb. Tie using $\frac{1}{2}$ "
Cold Drawn Tie Rods

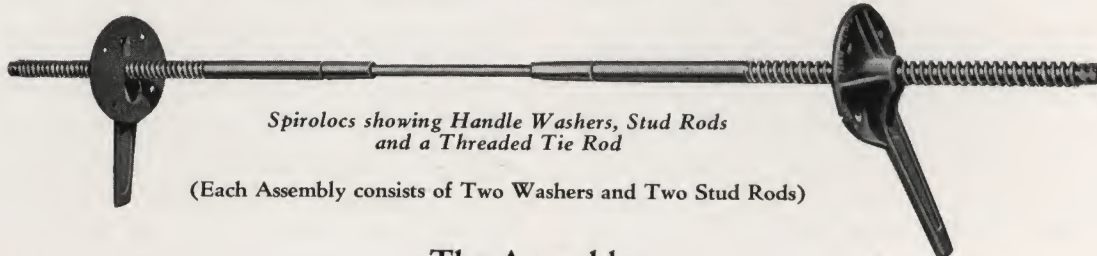
Spirolocs

Pat. No. 1,925,689

A 14,000 lb. Tie using $\frac{5}{8}$ "
Cold Drawn Tie Rods
A 20,000 lb. Tie using $\frac{3}{4}$ "
Cold Drawn Tie Rods

For All Types of Concrete Construction

Furnished with either Handle Washers or Nut Washers



*Spirolocs showing Handle Washers, Stud Rods
and a Threaded Tie Rod*

(Each Assembly consists of Two Washers and Two Stud Rods)

The Assembly

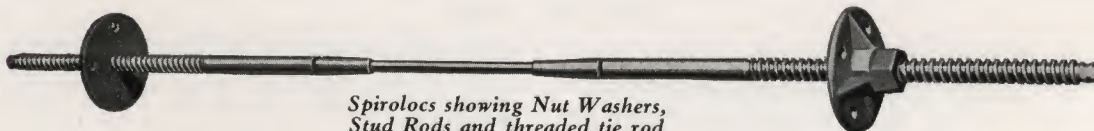
FEATURES

1. Easily inserted through holes drilled in the sheathing of the wall forms.
2. Wide Range of Adjustment to accommodate any dimensions of form lumber without removing the washers.
3. Keeps the tie rods the required distance back from the wall face.
4. Permits removal of the tie rod when required.
5. Leaves a small hole to be grouted.

The Spiroloc Washer Combination

The Combination of an Assembly using one Nut Washer and one Handle Washer:

1. Allows complete installation of the assembly, except handle washer, from one side of the forms.
2. Nut Washer acts as a stop to prevent the assembly from passing through the forms.
3. Handle Washer is slipped over the Stud Rod on the other side of the forms, seated against the wale and tightened with one complete turn.



*Spirolocs showing Nut Washers,
Stud Rods and threaded tie rod*

CATALOGUE NUMBERS—Standard Assemblies

Each Assembly consists of 2 Stud Rods and 2 Washers

With Handle Washers

ASSEMBLY NUMBER	DIAMETER		WEIGHT PER ASSEMBLY
	TIE ROD	STUD ROD	
615	$\frac{3}{8}$ "	$\frac{5}{8}$ "	4 $\frac{1}{4}$ lbs.
*625	$\frac{3}{8}$ "	$\frac{3}{4}$ "	6 $\frac{3}{4}$ lbs.
*635	$\frac{1}{2}$ "	$\frac{3}{4}$ "	6 $\frac{3}{4}$ lbs.
340	$\frac{5}{8}$ "	1 $\frac{5}{16}$ "	11 lbs.
350	$\frac{3}{4}$ "	1-1 $\frac{1}{16}$ "	16 lbs.

With Nut Washers

ASSEMBLY NUMBER	DIAMETER		WEIGHT PER ASSEMBLY
	TIE ROD	STUD ROD	
585	$\frac{3}{8}$ "	$\frac{5}{8}$ "	4 $\frac{1}{2}$ lbs.
*590	$\frac{3}{8}$ "	$\frac{3}{4}$ "	6 $\frac{1}{2}$ lbs.
*595	$\frac{1}{2}$ "	$\frac{3}{4}$ "	6 $\frac{1}{2}$ lbs.
†560	$\frac{3}{4}$ "	1-1 $\frac{1}{16}$ "	15 $\frac{1}{4}$ lbs.

*Rented—with option to purchase.

†Nut Washers are Malleable Iron.

SPIROLOCS can also be furnished for $\frac{7}{8}$ " and 1" threaded tie rods.

Physical Properties of Spirolocs

SIZE OF SPIROLOC (DIA. OF TIE ROD)	Handle Washers		Nut Washers		Stud Rods		LENGTH OF OUTSIDE THREAD
	DIAMETER OF BASE	AREA OF BASE	DIAMETER OF BASE	AREA OF BASE	OUTSIDE DIAMETER	OVERALL LENGTH	
$\frac{3}{8}$ "	4 $\frac{1}{4}$ "	14.2 sq. in.	4"	12.6 sq. in.	$\frac{5}{8}$ "	15 $\frac{5}{8}$ "	6 $\frac{3}{8}$ "
$\frac{3}{8}$ "	4 $\frac{1}{2}$ "	15.9 sq. in.	4 $\frac{1}{4}$ "	14.2 sq. in.	$\frac{3}{4}$ "	20"	11 $\frac{1}{2}$ "
$\frac{1}{2}$ "	4 $\frac{1}{2}$ "	15.9 sq. in.	4 $\frac{1}{4}$ "	14.2 sq. in.	$\frac{3}{4}$ "	20"	11 $\frac{1}{2}$ "
$\frac{5}{8}$ "	4 $\frac{3}{4}$ "	17.8 sq. in.	-----	-----	$\frac{1}{8}$ "	22"	13"
$\frac{3}{4}$ "	5 $\frac{1}{2}$ "	23.8 sq. in.	5 $\frac{1}{2}$ "	23.8 sq. in.	1 $\frac{1}{8}$ "	26"	15 $\frac{7}{8}$ "

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

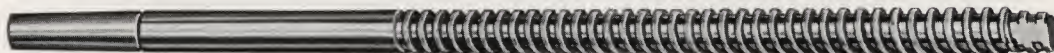
Spirolocs

Pat. No. 1,925,689

For All Types of Concrete Construction
Furnished with Either Handle Washers or Nut Washers

The Stud Rod

CATALOGUE NUMBERS ON PAGE 7.



1. Interchangeable—Fits either Handle Washer or Nut Washer.
2. Removed without stripping the forms or removing the wales.
3. Stronger than a cold drawn tie rod.
4. End flattened to a nut section—for easy removal.
5. Made from smooth surfaced high tensile cold drawn steel.
6. Gauge Rings—For gauging wall widths.
7. Extra long tapered nose—concentric with tapped hole:
 - (a) first backward turn completely breaks bond of concrete.
 - (b) prevents spalling of concrete.
 - (c) decreases length of tie rod.
 - (d) increases cut back of tie rod from face of wall.
8. Special Square Cut Threads:
 - (a) fast application and removal.
 - (b) self cleaning—will not clog with concrete.
 - (c) durable—strong—long life—low maintenance cost.

The Handle Washer: Malleable

CATALOGUE NUMBERS ON PAGE 7.



1. One piece combination handle, washer and wrench.
2. Keyhole opening—slides over the stud rod into approximate position—one turn completes adjustment.
3. Threads cast with offset keys that:
 - (a) seat and lock the washer on the stud rod.
 - (b) prevent unseating under load.
 - (c) cannot be removed without one complete turn backward.
 - (d) will not fall off.
 - (e) are self-cleaning—indestructible—strong—durable.
4. Rectangular hole in the face to act as wrench for removing stud rod.
5. Extra large bearing area—will not “bite” wale under maximum load.
6. Cored holes for nailing—prevent movement—will not loosen under mechanical vibration.
7. Stronger than the stud rod.



The Nut Washer: Cast Iron

CATALOGUE NUMBERS ON PAGE 7.

1. One piece combination nut and washer.
2. Hex Nut for applying wrench when tightening and loosening.
3. Removed with the stud rod as a unit—minimizing number of pieces to be handled.
4. Cored Holes for nailing—prevent loosening under mechanical vibration.

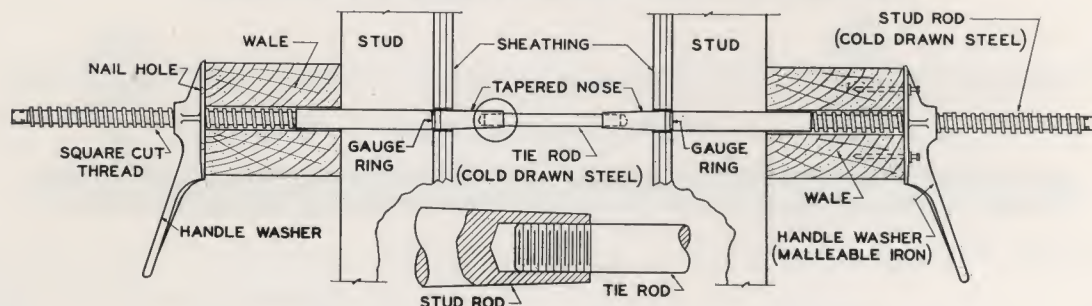
See opposite page for Physical Properties of SPIROLOCS

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Spirolocs

Pat. No. 1,925,689

For All Types of Concrete Construction
Furnished with either Handle Washers or Nut Washers



APPLICATION AND REMOVAL

The Handle Washer Assembly

Application



The two Stud Rods are assembled with the proper threaded tie rod. This assembly is passed through the holes provided in the wall forms.

The Handle Washers are slipped over the Stud Rods, seated against the wale, and with one complete turn, the forms are drawn into line.

Double headed nails are driven through the cored holes in the Handle Washers into the wales to prevent the Handle Washers from loosening. This is essential when concrete is mechanically vibrated.

Removal

The nails are removed from the Handle Washer.

The Handle Washer is loosened with a turn or two and slid off the Stud Rod.

To remove the Stud Rod use the rectangular hole in the face of the Handle Washer by applying it to the nut section at the end of the Stud Rod backing it off of the inside tie rod.

The Nut Washer Assembly

Application



The two Stud Rods and the proper threaded tie rod are assembled and a Nut Washer spun on one end into approximate position. This assembly is then passed through the holes provided in the wall forms. The one Nut Washer, already in place, acts as a stop to prevent the assembly from passing through the forms.

The other Nut Washer is then spun on the Stud Rod on the other side of the form, completing the installation.

The forms are drawn into line by applying a wrench to the hexagonal portion of the Nut Washer. Nails are then driven through the cored holes in the face of the Nut Washer to prevent loosening under mechanical vibration.

Removal

The nails are removed from the Washer.

The Nut Washer is loosened with a wrench and removed with the Stud Rod as a unit.

To remove the Stud Rod use the hole provided in the small end of the Combination Wrench. The Wrench is shown on Page 7.

Spacings of Ties, Studs and Wales

Using $\frac{3}{8}$ " Spirolocs (5,000# Tie) with cold drawn threaded tie rods

AT 50° TEMPERATURE					FOR $\frac{3}{4}$ " SHEATHING, 2x4 STUDS & DOUBLE 2x4 WALES	AT 70° TEMPERATURE				
2'	3'	4'	5'	6'	Rate of Pour (Vertical Feet per Hour).	2'	3'	4'	5'	6'
22"	20"	18"	16"	15"	Stud spacing for safe value of sheathing.	24"	22"	20"	18"	18"
30"	28"	26"	25"	24"	Wale spacing for safe value of studs.	33"	30"	29"	28"	26"
33"	29"	27"	25"	24"	Tie spacing for safe value of wales and ties.	36"	33"	30"	28"	27"

Using $\frac{1}{2}$ " Spirolocs (9,000# Tie) with cold drawn threaded tie rods

AT 50° TEMPERATURE					FOR $\frac{3}{4}$ " SHEATHING, 2x6 STUDS, DOUBLE 2x6 WALES	AT 70° TEMPERATURE				
2'	3'	4'	5'	6'	Rate of Pour (Vertical Feet per Hour)	2'	3'	4'	5'	6'
22"	20"	18"	16"	15"	Stud spacing for safe value of sheathing	24"	22"	20"	18"	18"
47"	43"	40"	39"	37"	Wale spacing for safe value of studs	51"	47"	45"	44"	40"
40"	37"	34"	32"	30"	Tie spacing for safe value of wales	45"	40"	38"	36"	34"

See pages 20 and 21 for general spacing tables

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Accessories for Spirolocs

The Combination Wrench



The Combination Wrench is a malleable casting which is used to tighten and loosen the Nut Washers and to remove the Stud Rods.

The overall length of the wrench is 12".

CATALOGUE NUMBERS

WRENCH NUMBER	FOR ASSEMBLY NUMBERS	WEIGHT EACH
484	585	2 1/4 lbs.
494	590-595	2 1/4 lbs.

The Spiroloc Rod Puller



The Rod Puller consists of three parts as follows:

A 3/4" forged steel rod 28" long with a bolt head on one end and threaded on the other end to receive a special steel nut.

A special steel nut for connecting the Rod Puller to the Stud Rod.

A cast iron (ram) weight.

Application

The Rod Puller is used when the tie rods are to be pulled from the wall. The Nut Washer and Stud Rod are completely removed from the wall forms on one side. A slight turn of the remaining Stud Rod will break the bond between it and the concrete. The Rod Puller is then attached to the outer end of the Stud Rod and by using a ram action the assembly is removed.

Pulling of tie rods is only recommended with 3/8" and 1/2" tie rods and when walls are not greater than 18" thick.

Rods should always be pulled from the inside or unexposed side of the wall.

CATALOGUE NUMBERS

PULLER NUMBER	FOR ASSEMBLY NUMBERS	WEIGHT EACH
483	615-585	13 lbs.
493	625-635-590-595	13 lbs.

Parts for Spiroloc Rod Pullers

No. 1481—Puller Rod 28" long. Weight 4 lbs. each.

No. 1492—Special Steel Nut for No. 483 Rod Puller. Weight 1 lb. each.

No. 1493—Special Steel Nut for No. 493 Rod Puller. Weight 1 lb. each.

No. 1484—Cast Iron Weight (Ram). Weight 8 lbs. each.

Threaded Tie Rods

UNIVERSAL is equipped to furnish from stock 3/8", 1/2" and 5/8" threaded tie rods made from high tensile cold drawn steel. All rods are cut to accurate lengths and are accurately threaded.

To Order Threaded Tie Rods

SIZE OF TIE ROD	LENGTH OF THREAD	BREAKBACK	DEDUCT FROM WALL THICKNESS
3/8"	7/8"	1 1/4"	3"
1/2"	1"	1 1/2"	3"
5/8"	1"	1 1/2"	3"
3/4"	1 1/4"	1 1/2"	3"

For Ties farther back than 1 1/2", double the dimensions the tie is to be back from the wall face and deduct that amount from the actual wall thickness.

Inside Tie Rod Loadings

(High Tensile Cold Drawn Steel Rods)

DIAMETER OF TIE ROD	RECOMMENDED WORKING LOAD	LOADS AT FAILURE
3/8"	5,000 lbs.	8,100 lbs.
1/2"	9,000 lbs.	13,860 lbs.
5/8"	14,000 lbs.	20,500 lbs.
3/4"	20,000 lbs.	29,000 lbs.

See Page 6 for spacing tables using 3/8" and 1/2" SPIROLOCS.

Parts for Spirolocs

The Handle Washers: Malleable



CATALOGUE NUMBER	SIZE OF TIE RODS	OUTSIDE DIAMETER OF STUD ROD	WEIGHT EACH
617	3/8"	5/8"	1 lb.
627	3/8"	3/4"	1 3/8 lbs.
637	1/2"	3/4"	1 3/8 lbs.
342	5/8"	1 1/8"	2 1/4 lbs.
352	3/4"	1 1/8"	3 lbs.

The Nut Washers: Cast Iron



CATALOGUE NUMBER	SIZE OF TIE RODS	OUTSIDE DIAMETER OF STUD ROD	WEIGHT EACH
587	3/8"	5/8"	1 lb.
592	3/8"	3/4"	1 1/4 lbs.
597	1/2"	3/4"	1 1/4 lbs.
*561	3/4"	1 1/8"	2 3/8 lbs.

*Malleable Iron Nut Washer

The Stud Rods

For use with either Handle Washers or Nut Washers



CATALOGUE NUMBER	SIZE OF TIE RODS	OUTSIDE DIAMETER OF STUD ROD	WEIGHT EACH
616	3/8"	5/8"	1 1/8 lbs.
626	3/8"	3/4"	2 lbs.
636	1/2"	3/4"	2 lbs.
341	5/8"	1 1/8"	3 1/4 lbs.
351	3/4"	1 1/8"	5 1/4 lbs.

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

The Assembly for Cone Nuts

For 1/2" Threaded Tie Rods

Providing a Positive Internal Spreader

For water-tight and stainproof walls and wherever ties must be back from the wall face.

A 9,000 lb. Tie using 1/2" Cold Drawn Tie Rod



*Each Assembly for Cone Nuts consists of
2 Stud Rods and 2 Nut Washers only*

FEATURES:

The Assembly:

1. Positive spreader.
2. Strong 9,000 lb. tie—using cold drawn tie rods.
3. Wide range of adjustment to accommodate any dimensions of form lumber
4. Four-piece assembly after first use.

The Stud Rod:

1. Removed without stripping the forms or removing the wales.
2. End flattened to a nut section—easy removal.
3. Made from high tensile cold drawn steel.
4. Special square cut threads—will not clog with concrete.
5. Threaded and tapered nose—easily inserted into cone nut.

The Nut Washer:

1. One piece combination nut and washer.
2. Hex nut for applying wrench when tightening and loosening.
3. Large bearing area.
4. Cored holes for nailing—prevent loosening under mechanical vibration.
5. Cast threads—strong and accurate.
6. Removed with the stud rod as a unit minimizing number of pieces to be handled

The Cone Nut:

1. Accurately drilled and tapped.
2. Machine tapered concentric with tapped hole—easily removed—prevents spalling.
3. Leaves a neat hole to be grouted—threaded end of tie rod acts as dowel to hold grout plug.
4. Covers hole in form—prevents grout leakage.
5. Wrench socket in end.

CATALOGUE NUMBER

No. 675—Assembly for Cone Nuts—Weight 4 1/2 lb. per Assembly.

For 1/2" Threaded Tie Rods.

(Each Assembly consists of 2 Stud Rods and 2 Nut Washers only.)

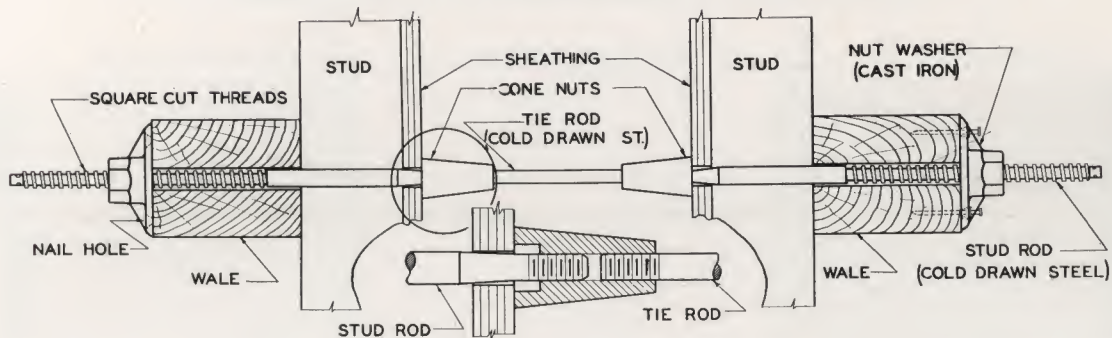
This Assembly can be furnished with Handle Washer if desired.

See pages 16 and 17 for complete description of Cone Nuts.

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

The Assembly for Cone Nuts

For 1/2" Threaded Tie Rods



Application

Two Cone Nuts and a threaded tie rod are assembled. This assembly is then attached to one Stud Rod. This Stud Rod is passed through the forms from the inside. A Nut Washer is placed on the Stud Rod and tightened against the wale by use of the Combination Wrench.

The other side of the forms is then erected, the other Stud Rod is threaded into the exposed end of the Cone Nut, a Nut Washer is placed on this Stud Rod and tightened against the wale, completing the installation.

Nails are then driven through the cored holes in the face of the Nut Washer to prevent loosening under mechanical vibration.

Removal

The nails are removed from the Washer.

Loosen the Nut Washers with the Combination Wrench (do not remove the Nut Washer from the Stud Rod). Apply the opening in the small end of the Combination Wrench to the flattened end of the Stud Rod and remove the Stud Rod and Nut Washer intact. Strip the forms.

A light tap on the end of the Cone Nut prior to the application of the wrench will assist in breaking the bond of the concrete. The Cone Nuts are then removed by use of the Cone Nut Wrench and the hole plugged.

Threaded Tie Rods

Threaded tie rods with Cone Nuts provide a positive internal spreader that insures exact wall thicknesses. **No adjustments are necessary.**

Threaded tie rods furnished by Universal are so threaded that when the cone nuts are up to the end of the thread, the out to out distance will be the exact wall thickness.

When ordering threaded tie rods for use with the Assembly for Cone Nuts be sure to specify the wall thickness and the type of Cone Nut being used, whether cast iron or steel. The last two columns in each of the tables on Page 16 show complete information to be given when ordering threaded rods to be used with both types of Cone Nuts.

ACCESSORIES FOR THE ASSEMBLY FOR CONE NUTS

The Combination Wrench



The Combination Wrench is a malleable casting which is used to tighten and loosen the Nut Washers and to remove the Stud Rods.

No. 484—Combination Wrench.....Weight 2 1/4 lbs each.

The Cone Nuts



The Steel Cone Nut

No. 253—Cast Iron Cone Nuts for 1/2" tie rods. Weight 3/4 lb. each.

No. 248—Steel Cone Nuts for 1/2" tie rods. Weight 1/4 lb. each.

See pages 16 and 17 for detailed description of Cone Nuts and Cone Nut Wrenches.

Wrenches for Removing Cone Nuts



No. 263—Wrench for removing Steel Cone Nuts. Weight 1 1/2 lbs. each.

No. 273—Wrench for removing Cast Iron Cone Nuts. Weight 1 1/2 lbs. each.

PARTS FOR THE ASSEMBLY FOR CONE NUTS

The Stud Rod



No. 676—The Stud Rod. 16 1/2" long overall. Outside Diameter 5/8". Weight 1 1/8 lbs. each.



The Nut Washer

No. 587—The Nut Washer. Diameter of Base 4". Area of Base 12.6 sq. in. Weight, 1 lb. each.

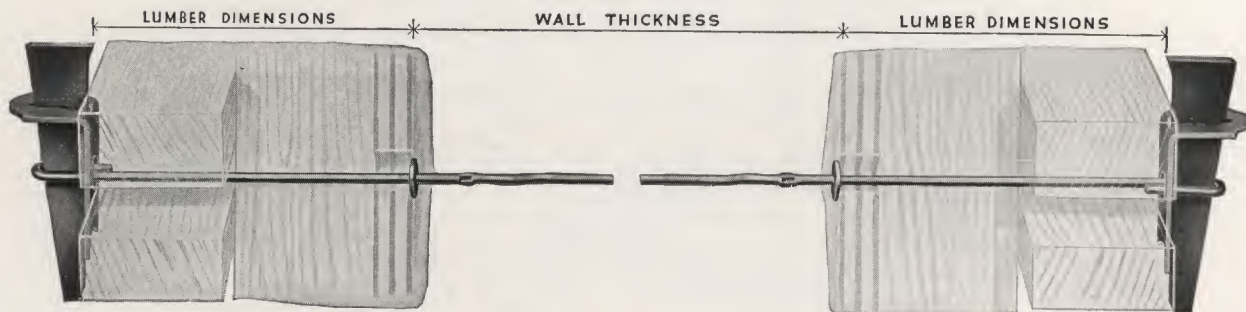
See Pages 14 and 15 for general spacing tables.

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Twistyes

T. M. Reg. U. S. Pat. Off. Pat. Nos. 1,911,701 and 2,095,714

For Ordinary, Finished and Water-tight Walls



A STRONG SPREADER TIE that can be twisted off back of the wall face without removing the forms
combined with

AN IMPROVED CLAMP that has ample take-up and a large bearing area that will not "bite" the wales under maximum load.

A 3,000-LB. TIE—WITH THE FOLLOWING FEATURES

The Tie:

1. Easily inserted through holes drilled in the sheathing of the wall forms, easily placed between panels, easily laid between boards as form is built up.
2. Can be twisted-off back of the wall face.
3. Strong spreader—assures accurate wall widths.
4. Fabricated to accommodate any size of form lumber or wall width.
5. Leaves a small hole to be grouted.
6. Removed without stripping the forms;
 - (a) no projecting wires to interfere with stripping;
 - (b) eliminates danger of injury to workmen.

TO ORDER

Specify type of Twistye desired—see details at top of next page.

Give wall thicknesses and actual overall lumber dimensions as shown in the illustration at the top of the next page.

The weight of 1,000 Twistyes for a 6" wall is 350 pounds.

For each additional six inches of wall thickness add 70 pounds per 1,000 pieces.

STOCK

Twistyes are stocked in all even inch wall thicknesses from 6" to 30". Stocked sizes are made with ends for use with standard lumber, i. e., $\frac{3}{4}$ " sheathing, 2 x 4 studs, double 2 x 4 wales ($\frac{8}{8}$ " actual).

Twistyes for fractional wall widths and lumber sizes other than standard are fabricated to order.

The Clamp:

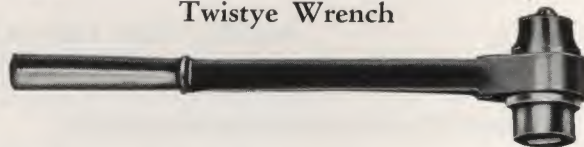
1. One piece combination wedge and bearing plate.
2. Easily applied and removed.
3. Will not turn—cannot fall off.
4. Ample take-up—overcomes irregularity in lumber sizes.
5. Large bearing area—will not "bite" the wale under maximum load.
6. Hardened wedge, high grade steel bearing plate—indestructible;
 - (a) extremely long life;
 - (b) no maintenance cost;
 - (c) economical.

Twistye Clamps

No. 360—Twistye Clamps—These clamps are used for all types of Twistyes. They are packed 125 to a sack.
Weight per 1000—600 pounds.



Twistye Wrench



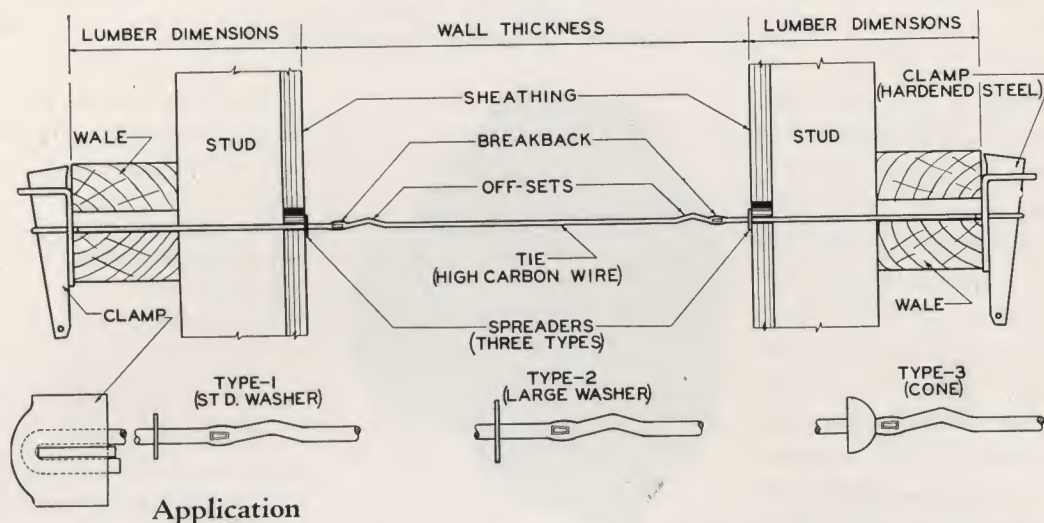
The Twistye Wrench is especially used for breaking off the Twistyes before stripping the forms.

No. 363—Twistye Wrench—Weight, 3 lbs. each.

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Twistyes

T. M. Reg. U. S. Pat. Off. Pat. Nos. 1,911,701 and 2,095,714



Application

The methods of erection depend on job conditions and the type of forms used.

Where forms are built up board by board, or when panels are wale height Twistyes can be laid in the joints of the boards or between the panels.

With the Standard Twistye, where panels larger than wale height are used, or when both sides of the forms are erected before the ties are placed, $\frac{7}{8}$ " holes are drilled opposite each other and the tie is passed through.

With the Cone Twistye, where panels larger than wale height are used, $\frac{3}{4}$ " holes are drilled opposite each other and one end of the tie is inserted through the hole in the sheathing. Then as the opposite panel is raised into position the free end of the tie is guided into a corresponding hole.

The diameter of the washer or the cone is large enough to provide a satisfactory spreader regardless of the method of application.

The ease with which the Clamp is seated and the wedge tightened materially speeds up the final operation of clamping the forms.

Removal

The Clamp is removed from the Twistye.

The Twistye is broken off (a half turn does it) before removing the forms. The Twistye Wrench is available for breaking the tie.

The forms are now free and when stripped from the wall the end of the tie is also removed, leaving the wall clean and ready to be pointed.

Specifications

The Twistye

The Tie is made of No. 4 high carbon wire with looped ends. It has washers or cones to provide spreader action.

The Tie is deformed so that it will break back either $\frac{3}{4}$ " or 1" from the face of the concrete. It is also deformed to prevent turning and retain the bond.

The washer diameter on the Standard Twistye is of a size that will permit the tie to pass through a $\frac{7}{8}$ " hole.

The Cone diameter of the Cone Twistye is large enough to prevent grout leakage through the holes drilled in the sheathing.

The Clamp

It is a specially hardened steel adjustable wedge integral with a steel bearing plate. These two parts cannot be separated. The plate is two inches wide and three and one-half inches long, which gives more than sufficient bearing on the wales. The ample take-up of the wedge is a real asset in overcoming irregularity in lumber sizes. The Clamp cannot turn or drop off.

Strength of Twistyes

THE STRENGTH of Twistyes is best shown by the table below, which gives the maximum safe spacing not only for ties, but for studs and wales. These spacings are based on an allowable safe fibre stress of 1,800 lbs. per

square inch giving $\frac{L}{30}$ (in feet) as the maximum deflection

in inches for yellow pine lumber or its equivalent. The factor of safety on ties is in ratio. The ultimate strength of Twistyes is over 4,000 lbs.

AT 50° TEMPERATURE				FOR $\frac{3}{4}$ " SHEATHING, 2x4 STUDS, DOUBLE 2x4 WALES	Rate of Pour (Vertical Feet per Hour)	AT 70° TEMPERATURE			
2'	3'	4'	5'			2'	3'	4'	5'
22"	20"	18"	16"	Stud spacing for safe value of sheathing		24"	22"	20"	18"
30"	28"	26"	25"	Wale spacing for safe value of studs		33"	30"	29"	28"
32"	28"	24"	20"	Tie spacing for safe value of wales and ties		36"	33"	28"	24"

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

A 1,500 lb. Tie using $\frac{1}{4}$ "
Mild Steel Rods

A 3,000 lb. Tie using $\frac{3}{8}$ "
Mild Steel Rods

Form Clamps

Design Pat. No. 105,103

For All Types of Concrete Construction

A 5,000 lb. Tie using $\frac{1}{2}$ "
Mild Steel Rods

An 8,000 lb. Tie using $\frac{5}{8}$ "
Mild Steel Rods

The Form Clamp is a casting with a flanged bearing surface providing ample bearing on the wales to prevent "bite" at maximum loads.

The Form Clamp has an oval hole through which a plain round rod is passed. The cross section below shows the offset in the center of the clamp with the shoulders. At the top of the Form Clamp a set screw is threaded to engage the rod intermediate of the shoulders, thereby depressing the rod between the shoulders.



Two Form Clamps and a length of mild steel rod comprise a Form Tie.

The flange of the Form Clamp has notches to receive nails driven into the wale to hold the Form Clamp in position.

CATALOGUE NUMBERS

CATALOGUE NUMBER	SIZE OF ROD	WEIGHT PER 100
1	$\frac{1}{4}$ "	63 lbs.
2	$\frac{3}{8}$ "	151 lbs.
3	$\frac{1}{2}$ "	208 lbs.
4	$\frac{5}{8}$ "	327 lbs.

Form Clamps can also be furnished for $\frac{3}{4}$ ", $\frac{7}{8}$ " and 1" Rods.

FEATURES

The Clamp:

1. The Sure Grip Principle—prevents slipping.
2. A single unit—simple in principle and application.
3. A tough casting—its life is unlimited.
4. Provided with large set screw—deforms rod against shoulder very easily.
5. Can be used in various combinations—with cone or hex nuts and threaded tie rods—with riser ties—for hanging forms—for tying columns.
6. Removed without stripping the forms.
7. Large bearing area—will not "bite" wale under maximum load.
8. Safe—Efficient—Economical.

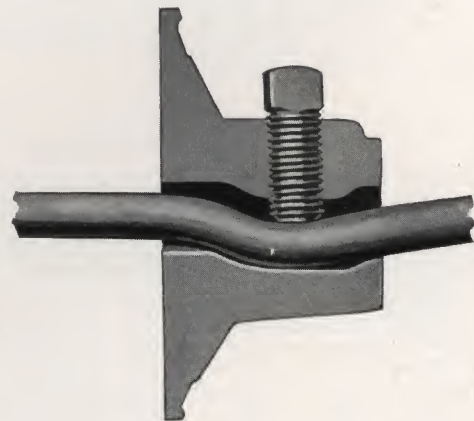
The Rod: (Mild Steel)

1. Can be purchased locally—cut to length on the job as required.
2. Can be pulled from the wall with the Universal Rod Puller.
3. Leaves a small hole to be grouted.

The Sure Grip Principle

The cross-section at the right shows the simplicity of the Form Clamp. The principle of the shoulder and set screw gives Universal Form Clamps a tremendous holding power.

The set screw does not carry the load, it merely holds the rod in the depression, throwing the load on the shoulders of the Form Clamp. The depression of the rod between the shoulders insures the Form Clamp against slipping or moving on the rod.

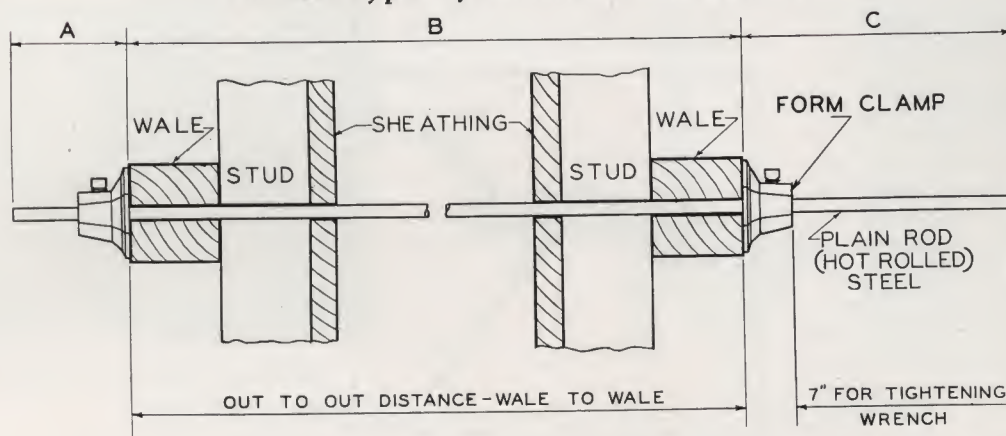


SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Form Clamps

Design Pat. No. 105,103

For All Types of Concrete Construction



Application

The rod is cut to length, a Form Clamp is firmly fastened on one end and this assembly is passed through the form until the Form Clamp is in place against the wale.

The other Form Clamp is slipped over the rod from the other side of the forms.

The forms are drawn to the correct width with the Universal Tightening Wrench and the set screw is tightened. The Tightening Wrenches and Set Screw Wrenches are described on Page 14.

Removal

The set screw is loosened and the Form Clamp removed from the rod.

The forms are removed and the rods cut off flush with the wall face.

When removal of the rod is specified the rod is jacked out with the Universal Rod Puller. The Rod Puller is described on Page 15.

Physical Properties of Form Clamps

FORM CLAMPS	BASE DIAMETER	AREA OF BASE	LENGTH
No. 1 (1/4")	2 3/8"	4.76 sq. in.	1 3/8"
No. 2 (3/8")	3"	7.46 sq. in.	1 7/8"
No. 3 (1/2")	3 3/4"	11.65 sq. in.	2"
No. 4 (5/8")	4 1/2"	16.77 sq. in.	2 3/8"

To Order Rods

A plus B plus C equals the length of the rod.

FORM CLAMP NUMBER	ROD SIZE	A	C
1	1/4"	3"	8 1/2"
2	3/8"	4"	9"
3	1/2"	4"	9"
4	5/8"	4 1/2"	9 1/2"

Form Clamps with Hex Nuts



Form Clamps with Paper Tubing



Form Clamps with Cone Nuts



Rod Loadings (Mild Steel Rods)

ROD SIZE	RECOMMENDED WORKING LOADS	YIELD POINT OF RODS	AVERAGE STRENGTH MAXIMUM LOADS
1/4"	1,500 lbs.	2,300 lbs.	2,530 lbs.
3/8"	3,000 lbs.	5,370 lbs.	7,580 lbs.
1/2"	5,000 lbs.	9,600 lbs.	13,259 lbs.
5/8"	8,000 lbs.	12,450 lbs.	18,500 lbs.

Spacings of Ties, Studs and Wales Using 1/2" Form Clamps with Mild Steel Rods

AT 50° TEMPERATURE					FOR 3/4" SHEATHING, 2x4 STUDS & DOUBLE 2x6 WALES					AT 70° TEMPERATURE				
2'	3'	4'	5'	6'	Rate of Pour (Vertical Feet per Hour)					2'	3'	4'	5'	6'
22"	20"	18"	16"	15"	Stud spacing for safe value of sheathing					24"	22"	20"	18"	16"
30"	28"	26"	25"	24"	Wale spacing for safe value of studs					33"	30"	29"	28"	27"
51"	42"	37"	32"	29"	Tie spacing for safe value of wales and ties					56"	51"	45"	40"	35"

See Pages 20 and 21 for General Spacing Tables

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

The Tightening Wrench

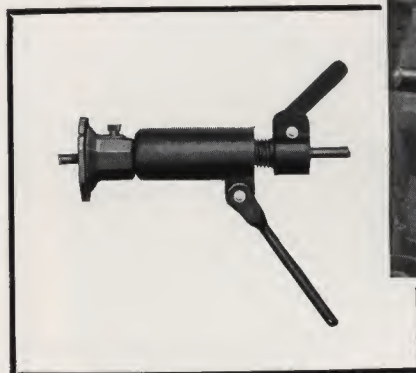
Des. Pat. No. 105,103

The Tightening Wrench is used in conjunction with the Form Clamp to exert a pressure against the form to draw it into line or to desired dimensions.

The Tightening Wrench is made of six parts—namely, the nut which bears against the clamp, the hollow screw through which the rod passes, a cam, a handle, a handle pin, and a cam pin.

NOTE: The Tightening Wrench is extremely powerful and if applied too vigorously will bend, break, or drive into the forms any spreader used. Stop when resistance is encountered.

The Tightening Wrench and Form Clamp in place on the rod



Aligning the Forms with the Tightening Wrench

CATALOGUE NUMBERS

CATALOGUE NUMBER	ROD SIZE	CLAMP NUMBER	WEIGHT EACH
211	1/4"	1	3 3/4 lbs.
212	3/8"	2	4 lbs.
213	1/2"	3	4 1/2 lbs.
214	5/8"	4	5 1/2 lbs.

Tightening Wrenches can be furnished for 3/4", 7/8", and 1" Rods.

Application

The Tightening Wrench is placed over the rod and snugged against the clamp. The cam is set. The slightest pressure against the nut when the cam engages the rod will lock the Tightening Wrench on the rod.

For drawing the forms together, it is only necessary to turn the handle and unscrew the nut from the screw, the same as with an ordinary jackscrew. When the form is in position, the set screw in the clamp is tightened.

Before the Tightening Wrench is removed, the handle is given a couple of turns backward to relieve the pressure on the cam.

PARTS FOR TIGHTENING WRENCHES



- No. 1211—Screw for No. 211 1/4" Tightening Wrench
- No. 1212—Screw for No. 212 3/8" Tightening Wrench
- No. 1213—Screw for No. 213 1/2" Tightening Wrench
- No. 1214—Screw for No. 214 5/8" Tightening Wrench
- No. 1221—Nut for No. 211 1/4" Tightening Wrench
- No. 1222—Nut for No. 212 3/8" Tightening Wrench
- No. 1223—Nut for No. 213 1/2" Tightening Wrench
- No. 1224—Nut for No. 214 5/8" Tightening Wrench

Following Parts are the same for all Sizes of Tightening Wrenches

- No. 1231—Handle for Tightening Wrench
- No. 1233—Cam for Tightening Wrench
- No. 1235—Handle Pin for Tightening Wrench
- No. 1237—Cam Pin for Tightening Wrench

The Set Screw Wrench



The Set Screw Wrench is used for tightening the set screws on the Form Clamps.

CATALOGUE NUMBERS

- No. 201—For No. 1 1/4" Form Clamps
- No. 202—For No. 2 3/8" Form Clamps
- No. 203—For No. 3 1/2" Form Clamps
- No. 204—For No. 4 5/8" Form Clamps

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

The Rod Puller—Heavy Duty

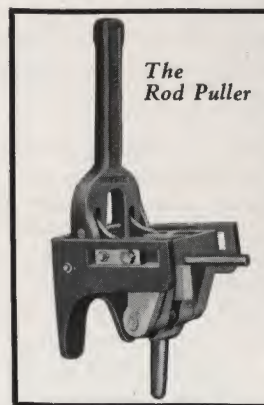
The Rod Puller is for removing or pulling the tie rods from the concrete. The Puller is designed to exert a pressure of from 10,000 to 15,000 pounds pull on the rod, depending on the length of pipe used on the handle.

The pull is in a straight line and the rods are not bent when they come out. The rods can be re-used, and the labor cost per foot of removing them with this puller is far less than the cost per foot of new rod.

Rods should be pulled not later than from sixteen to twenty-four hours after pouring the concrete in summer weather where the temperature ranges above 70 degrees. In winter weather rods can be left in the concrete four or five days. It is almost impossible to lay down a fixed rule as to the exact time of removing the rods. This can be determined very readily by trial.

When tie rods are to remain in the wall for any length of time before pulling, the use of Paper Tubing is recommended.

The Universal Heavy Duty Rod Puller is for pulling all



The Rod Puller



Removing the rod with the Rod Puller

sizes and lengths of rods. The parts of the Pullers are made of the highest grade steel castings obtainable.

CATALOGUE NUMBERS

Rod Pullers

CATALOGUE NUMBER	ROD SIZE	WEIGHT EACH
221	1/4"	32 lbs.
222	3/8"	32 lbs.
223	1/2"	32 lbs.
224	5/8"	32 lbs.

Pullers can also be furnished for 3/4", 7/8" and 1" Rods.

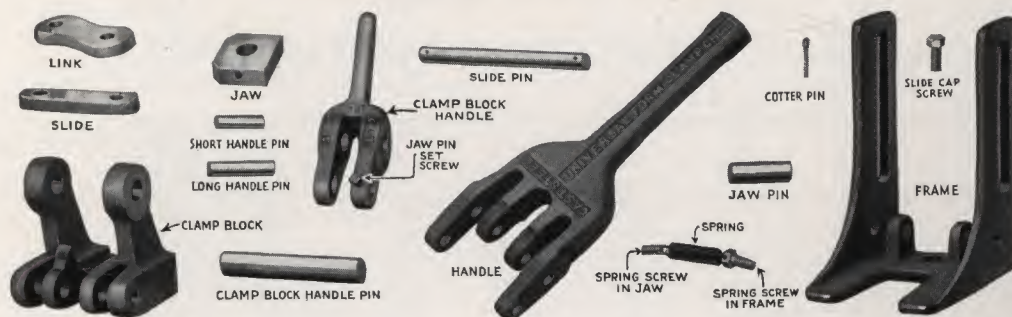
NOTE: Pullers have interchangeable Jaws.

Jaws for Rod Pullers

CATALOGUE NUMBER	ROD SIZE	WEIGHT EACH
1321	1/4"	3/4 lb.
1322	3/8"	3/4 lb.
1323	1/2"	3/4 lb.
1324	5/8"	3/4 lb.

Any size of Rod Puller can be used for any size of rod by changing the jaw.

PARTS FOR ROD PULLERS



The Following Parts are the same for all Sizes of Heavy Duty Pullers

No. 1328—Handle
No. 1329—Short Handle Pin
No. 1330—Long Handle Pin
No. 1331—Pair of Links
No. 1332—Slide Pin
No. 1333—Pair of Slides

No. 1334—Clamp Block
No. 1335—Frame
No. 1336—Jaw Pin
No. 1337—Clamp Block Handle Pin
No. 1338—Clamp Block Handle
No. 1339—Spring Screw in Jaw

No. 1340—Spring
No. 1341—Spring Screw in Frame
No. 1342—Slide Cap Screw
No. 1343—Jaw Pin Set Screw
No. 1344—Cotter Pin

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Cast Iron

Cone Nuts

Steel

Provide a Positive Internal Spreader

For water-tight and stainproof walls and wherever ties must be back from the wall face.



*The Cast Iron Cone Nut
—Square Opening*

The Cone Nuts with an inside tie rod and one of several methods of clamping the forms to an outside stud rod, form a combined tie and spreader which meets many conditions arising in constructing concrete wall forms.

Specifically, they are indispensable for an absolute internal spreader type tie and they meet specifications which require that no metal be exposed on the wall face.

Cone Nuts are made from both cast iron and steel.

Both cast iron and steel Cone Nuts are stocked in sizes as shown in the tables below.

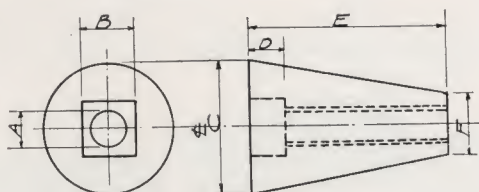
Both types are machined after tapping, insuring perfect concentricity and extreme ease in removal without spalling the concrete.

Either type of Cone Nut is stronger than the inside threaded tie rod.

The line diagram in the center of the page, used in connection with the tables below, shows the physical dimensions of the two types of Cone Nuts.

The large end of both types is provided with a wrench socket to receive a removal wrench.

For additional uses of Cone Nuts see the Assembly for Cone Nuts on Pages 8 and 9.



Application

Two Cone Nuts and a threaded tie rod are assembled. This assembly is then attached to one stud rod. This stud rod is passed through the forms from the inside. A Clamp is placed on the stud rod and tightened against the wale.



*The Steel Cone Nut
—Hex Opening*

The other side of the forms is then erected, the other stud rod is threaded into the exposed end of the Cone Nut, a Clamp is placed on this stud rod and tightened against the wale, completing the installation.

Threaded Tie Rods

When ordering threaded tie rods for use with the Cone Nuts be sure to specify the wall thickness and the type of Cone Nut being used, whether cast iron or steel. The last two columns in each of the tables below show complete information to be given when ordering threaded rods to be used with both types of Cone Nuts.

Threaded tie rods with Cone Nuts provide a positive internal spreader that insures exact wall thicknesses. No adjustments are necessary.

Threaded tie rods furnished by UNIVERSAL are so threaded that when the cone nuts are up to the end of the thread, the out to out distance will be the exact wall thickness.

CATALOGUE NUMBERS AND DIMENSIONS OF CONE NUTS

Cast Iron Cone Nuts

CATALOGUE NUMBER	A	B	C	E	F	WEIGHT PER 100	When Ordering Inside Rods DEDUCT FOR CONES	THREAD END
252	3/8"	1 7/8"	1 1/4"	2 1/8"	1 3/8"	40 lbs.	2 1/2"	7/8"
253	1/2"	2 1/2"	1 1/2"	2 5/8"	1 5/8"	70 "	3 1/4"	1 "
254	5/8"	2 5/8"	1 3/4"	2 5/8"	1 1/2"	88 "	3 1/4"	1 "
255	3/4"	3 1/2"	2 1/4"	3 3/8"	1 5/8"	180 "	4 "	1 3/8"
256	7/8"	1 1/8"	2 5/8"	3 1/2"	1 3/4"	260 "	4 "	1 1/2"
257	1"	1 1/8"	2 5/8"	3 1/2"	1 3/4"	260 "	4 "	1 1/2"

Steel Cone Nuts

247	3/8"	1 7/8"	1 5/8"	2 3/8"	2 3/8"	21 "	2 5/8"	7/8"
248	1/2"	2 1/2"	1 5/8"	2 3/8"	2 3/8"	21 "	2 5/8"	7/8"
249	5/8"	2 5/8"	1 1/8"	2 3/8"	7/8"	32 "	2 7/8"	1 1/8"

NOTE: All Cone Nuts are threaded continuously throughout with NC (U. S. Std.) threads.
Cone Nuts for a 2" Breakback can be furnished when required.

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Cone Nuts



Form Clamps with Cone Nuts and a threaded tie rod

Wrenches for Removing Cone Nuts



Removing the Cone Nut

Cone Nuts are quickly removed from the wall with the Cone Nut Wrench, which fits into the wrench socket provided in the large end of the Cone Nut.

Cast Iron Cone Nuts have a square wrench socket.

Steel Cone Nuts have a hexagonal wrench socket.

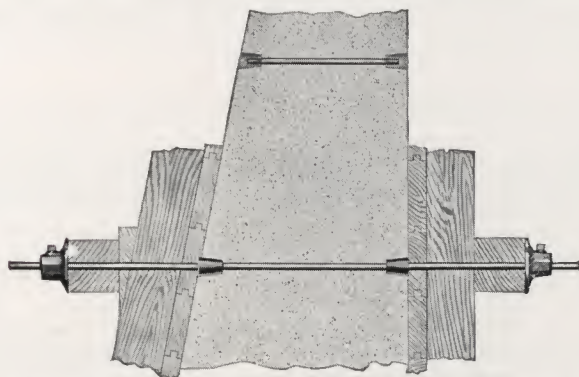
CATALOGUE NUMBERS OF WRENCHES

For Cast Iron Cone Nuts

CATALOGUE NUMBER	SIZE OF TIE ROD	WEIGHT EACH
272	3/8"	1 lb.
273	1/2"	1 1/2 lbs.
274	5/8"	2 lbs.
275	3/4"	3 lbs.
276	7/8"	4 lbs.
277	1"	4 lbs.

For Steel Cone Nuts

CATALOGUE NUMBER	SIZE OF TIE ROD	WEIGHT EACH
262	3/8"	1 1/2 lbs.
263	1/2"	1 1/2 lbs.
264	5/8"	2 lbs.



Cross-section of battered wall showing Cone Nuts in place with Stud Rods and Form Clamps and also Cone Nuts removed from the wall.

Hex Nuts

Steel

Cast Iron

Malleable



Hex Nuts with Form Clamps, stud rods and a threaded tie rod find a wide use in form work where no metal can be exposed and it is not necessary to salvage the castings for re-use.

The stud rod is removed and the hole is filled with grout leaving a clean, unblemished wall. A minimum of pointing is required.



The Hex Nuts are designed to develop the full strength of the rod.

Hex Nuts and washers are used to advantage as anchors in mass concrete construction. This combination is unsurpassed for a low cost, strong anchor.

The Hex Nuts are advantageous when cantilever forms are used in high gravity dams, walls and piers where the tie is not continuous from face to face.

Hex Nuts are also extensively used on heavy battered walls; in tying heavy sections across corners; to provide extensions at offsets and haunches; also to provide a deeper cut back than can be provided with the standard cone nuts.

CATALOGUE NUMBERS AND SIZES OF HEX NUTS

CATALOGUE NUMBER	SIZE OF TIE ROD	DIMETER FLAT	LENGTH	WEIGHT PER 100
Steel				
642	3/8"	1 1/8"	1 5/8"	11 lbs.
643	1/2"	1 1/8"	1 5/8"	11 lbs.
Cast Iron				
293	1/2"	1"	1 1/2"	28 lbs.
294	5/8"	1 1/8"	1 1/8"	35 lbs.
295	3/4"	1 3/8"	2"	60 lbs.
296	7/8"	1 5/8"	2 3/8"	100 lbs.
297	1"	1 7/8"	2 3/4"	160 lbs.
Malleable				
663	1/2"	1 1/8"	2 3/4"	53 lbs.
664	5/8"	1 3/8"	2 3/4"	55 lbs.
665	3/4"	1 1/4"	3"	60 lbs.
666	7/8"	1 3/8"	3"	105 lbs.
667	1"	1 5/8"	3"	105 lbs.
668	1 1/4"	1 7/8"	3"	125 lbs.
669	1 1/2"	2 3/8"	4"	300 lbs.

NOTE: All Hex Nuts are threaded continuously throughout with NC (U. S. Std.) threads.

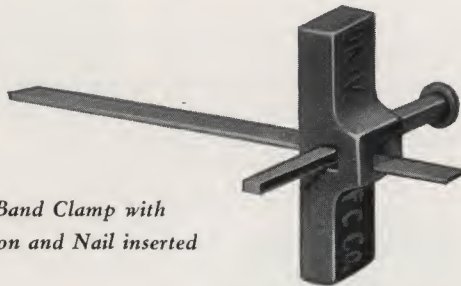
SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Band Clamp with Band Iron

Pat. Nos. 1,475,424, 1,515,335, 1,693,240

For Ordinary Walls and Spandrel Beams

The Band Clamp



*The Band Clamp with
Band Iron and Nail inserted*

The Band Clamp is a malleable casting with a slot in the center through which is passed a band $\frac{1}{2}$ " x 14 gauge. This band is held in the clamp by means of a 30-penny standard cut nail driven through the openings in the side of the clamp to deform the band against the shoulder in the clamp.

Band Clamps are symmetrical, there is no top or bottom and the nail can be inserted from either side.

The Band Clamp will hold the maximum load without permitting the band to slip.

The Band Iron

Universal Band Iron, $\frac{1}{2}$ " x 14 gauge, for use with the Band Clamps contains an extra carbon content that adds considerably to the tensile strength above that of commercial stock.

No. 366, $\frac{1}{2}$ " x 14 ga. Band Iron is furnished in coils about 95 pounds each. One thousand lineal feet weighs 145 pounds, or 670 feet per 100 pounds.

No. 367, $\frac{7}{8}$ " x 22 ga. Band Iron is furnished in coils about 70 pounds each. One thousand lineal feet weighs approximately 92 pounds or 1100 feet per 100 pounds.

CATALOGUE NUMBERS

CATALOGUE NUMBER	ITEM	WEIGHT
364	Band Clamps with Nails	43 lbs. per 100
365	30-D Nails for Band Clamps	100 lbs. per keg
366	$\frac{1}{2}$ " x 14 ga. Band Iron	95 lbs. per coil
367	$\frac{7}{8}$ " x 22 ga. Band Iron	70 lbs. per coil
374	Band Tightener	1 $\frac{1}{2}$ lbs. each

The strength of Band Clamps with Band Iron is best shown by the table below, which gives the maximum safe spacing not only for ties, but for studs and wales. These spacings are based on an allowable safe fibre stress of 1,800 lbs. per square inch, giving L (in feet) as the maximum

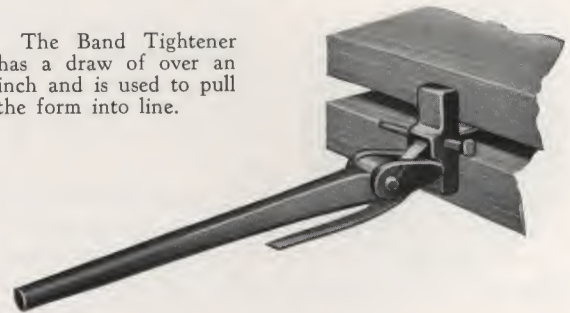
30

deflection in inches for yellow pine lumber or its equivalent. The factor of safety on ties is in ratio. The yield point of Universal's Special Band Iron, with Band Clamps, is 2,000 lbs.

The Band Tightener

Pat. No. 1,475,424

The Band Tightener has a draw of over an inch and is used to pull the form into line.



Application

Unless the amount involved is very small, it will pay to build a reel for the coils of band iron and a bench with a small hand shear placed next to the coil. The band iron can then be run out to a stop on the bench and sheared to length.

To save time and labor at the forms, one clamp should be fastened to one end of the band iron at the bench, and the assembly then carried to the forms.

Tying Wall Forms

Band Clamps are used with equal advantage on wooden panel forms or forms built in place. If the panels are built of square edged sheathing, a chisel driven in a crack gives sufficient room for the band. With similar sheathing used for building forms in place, the bands are laid between the boards at the proper spacing as erection progresses.

For Spandrel Beams

Universal Band Clamps used on Spandrels eliminate the use of braces and cumbersome L-Heads for tying beam sides. A double 2 x 4 wale is run along the top of the outer side of the spandrel; the Band Clamp bears on this wale, the other end of the band being nailed on the decking. If the work is on structural steel, the Universal Beam Clamp should be used, as described on Page 28.

AT 50° TEMPERATURE		FOR $\frac{3}{4}$ " SHEATHING, 2x4 STUDS, DOUBLE 2x4 WALES	AT 70° TEMPERATURE	
2'	3'	Rate of Pour (Vertical Feet per Hour)	2'	3'
22"	20"	Stud spacing for safe value of sheathing	24"	22"
30"	28"	Wale spacing for safe value of studs	33"	30"
14"	12"	Tie spacing for safe value of wales and ties	16"	14"

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

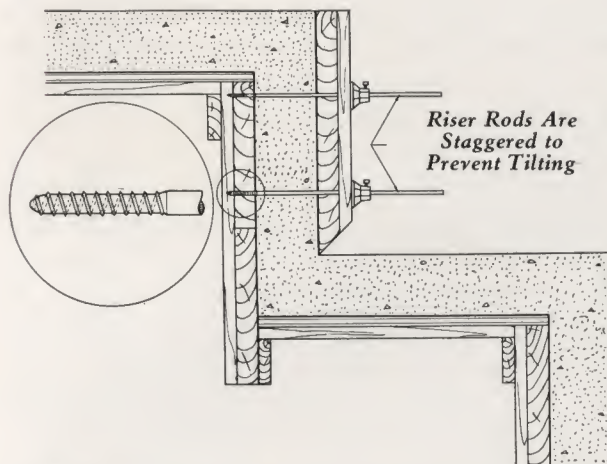
Riser Rods

Riser Rods with Form Clamps afford a most economical means of tying riser forms in stadium, grandstand and balcony construction. The two methods outlined are equally practicable.

No. 230—Riser Rod—24" long.

Weight 50 lbs. per 100 pieces.

Method A



Method A eliminates all work underneath and behind the forms. A No. 1 Form Clamp and a No. 0 Bright Basic Wire rod are used. The Rod is 24" long, with a 2" wood screw thread on one end which acts as a lag screw. This rod goes through the front form and screws into the rear form of the riser. A 1/4" hole should be drilled in the rear form before inserting the rod. An electric tool or brace is recommended for screwing the rod into the back form of the riser.

A Form Clamp is slipped over the outside end of the rod and the front form drawn into line with a Tightening Wrench.

One line of rods is sufficient for shallow risers. If the risers are deep, the rods should be staggered to prevent tilting.

Rods can be removed with the same tool with which they were inserted.

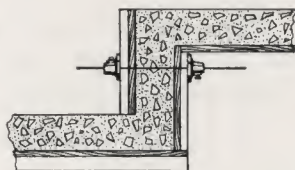
Method B

Method B makes use of a 1/4" plain rod and two No. 1 Form Clamps.

Holes are bored through the front and rear riser forms, and a rod with a Form Clamp already fastened on one end is inserted from the back.

The other Form Clamp is slipped over the rod from the front and the form drawn into line with the Universal Tightening Wrench.

The rod is easily removed with the Universal Rod Puller.



Paper Tubing



The Paper Tubing made to our specifications is of multiple ply strawboard, Kraft covered, heavily impregnated with paraffin at a high temperature. Its inside diameters are such that it will easily slip over a plain round rod.

Paper Tubing is stocked in 4-foot lengths. When walls exceed 4 feet in thickness, heavy paper sleeves 6" long are fitted snugly over the adjoining ends of the tubing.

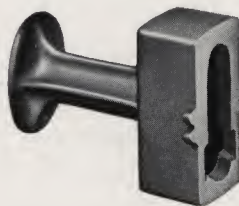
The Paper Tubing acts as a sleeve, preventing bond between the rod and the concrete. The Tubing should be four to six inches shorter than the width of the wall.

The Paper Tubing is slipped over the rod and placed so that the ends are two to three inches from the wall face. In this way it is only necessary to break the bond a few inches at the ends. The rod can then be pulled, leaving a clean hole not larger than the diameter of the rod to be grouted.

CATALOGUE NUMBERS

CATALOGUE NUMBER	ROD SIZE	WEIGHT PER 1,000 FEET
241	1/4"	23 lbs.
242	3/8"	29 lbs.
243	1/2"	50 lbs.
244	5/8"	60 lbs.
245	3/4"	65 lbs.

Adjustable Inserts



Adjustable Inserts, malleable castings, are used for hanging shelf angles, shaft hangers, sprinkler systems, etc.

This method of hanging saves considerable time and labor due to the fact that the slot into which the nut or bolthead is inserted, is adjustable the full length of the slot.

Notches on both sides of the insert provide for nailing it to the forms.

Inserts have holes for nailing to vertical forms, where concrete is mechanically vibrated.

CATALOGUE NUMBERS

CAT. NO.	BOLT SIZE	INSIDE DIMENSIONS			WEIGHT PER 100
		DEPTH	WIDTH	LENGTH	
412	3/8"	3/4"	1"	2 3/8"	68 lbs.
413	1/2"	3/4"	1"	2 3/8"	68 lbs.
414	5/8"	3/4"	1"	2 3/8"	70 lbs.
415	3/4"	3/4"	1 1/4"	2 3/8"	90 lbs.
416	7/8"	1"	1 1/2"	3"	125 lbs.

Design for Wall Forms

Explanation of Tables

The accompanying details and tables will fully explain the proper use of UNIVERSAL's Form Design Tables.

The form lumber should be selected after careful consideration of the following conditions:

- (a) The rate of pour in vertical feet per hour.
- (b) The setting temperature of the concrete.
- (c) The number of reuses of the form.
- (d) The possible other uses of the material.

The form tie which will develop the full allowable working load of the forms should be chosen. In addition specifications may require that the tie be removed entirely from the concrete or back a specified distance from the face. This should be taken into consideration when selecting the tie.

The rate of pour is determined by the thickness of the wall, the length of wall to be poured and the size or capacity of the concrete plant. Neither the height of the wall nor its width have anything to do with the pressure on the forms and their subsequent design. Only the rate of pour and the setting temperature of the concrete need be considered.

Two complete tables are shown on the next page; the table at the right is based on a setting temperature of 70°, which is considered the average for summer, and the table at the left is based on a setting temperature of 50°, which is the average winter temperature. The tables are so arranged that any carpenter on the job can use them, as well as the man in the engineering office. An example will serve to show their usefulness.

PROBLEM:

Determine the proper spacing of the studs, wales, ties and the unit load per tie, where the following conditions are known.

1. Sheathing— $\frac{3}{4}$ ", studs—2x6, wales—double 2x6.
2. Rate of pour 4 feet per hour.
3. Setting temperature of concrete—70°.

SOLUTION:

The table at the right is based on a setting temperature of 70° (meeting condition 3). In the table, columns are given for rates of pour varying from 2' to 6'. We are only concerned with the rate of 4 feet per hour, and the third column shows the correct spacing of the studs, wales and ties at this rate. Thus by reading down this column under the heading "Spacing of Studs" and opposite "spacing for $\frac{3}{4}$ " sheathing," the spacing of the studs is 20"; continuing under the heading "Spacing of wales" and opposite "2x6 studs, $\frac{3}{4}$ " sheathing," the spacing of the wales is 45"; and under "Spacing of ties," opposite "Double 2x6 wales, 2x6 studs, $\frac{3}{4}$ " sheathing," the spacing of the ties is 38".

The total load per tie is obtained by multiplying the maximum pressure per square foot (550 lbs.) found at the top of the column by the area supported by the tie. [spacing of the wales 45" (3.75'), times the spacing of the ties 38" (3.17')]. Thus $550 \text{ lbs.} \times 3.75 \times 3.17 = 6539 \text{ lbs.}$

Should the recommended working load of the tie selected be under 6539 lbs. the spacing between the ties is decreased accordingly. This is determined by dividing the working load of the tie by the product of maximum pressure per sq. ft. (in this case 550 lbs.) and wale spacing expressed in feet. Thus, if a 6000 lb. tie is used the proper spacing is $6000 \div (550 \times 3.75) = 2.91' (35")$.

This simple problem with its corresponding solution illustrates the proper use of the tables.

Note: When concrete is mechanically vibrated, reduce spacings approximately 15%.

To assist you in the proper selection of the Form Tie, we refer you to page 3 of this catalogue where all of Universal's Ties are classified.

For special problems, our engineering department will gladly send you estimates and recommendations, without obligation.

FORM DESIGN SETTING TEMPERATURE 70°

50°

2' 450 #	3' 600 #	4' 750 #	5' 900 #	6' 1050 #	6' MAXIMUM PRESSURE PER SQ. FT.	2' 350 #	3' 450 #	4' 550 #	5' 650 #	6' 750 #
SPACING OF STUDS FOR SAFE VALUE OF SHEATHING										
22"	20"	18"	16"	15"	SPACING FOR 3/4 SHEATHING	24"	22"	20"	18"	18"
30"	25"	22"	21"	20"	" 1-1/8	32"	30"	27"	25"	22"
41"	36"	32"	30"	28"	" 1-5/8	44"	41"	39"	37"	32"
SPACING OF WALES FOR SAFE VALUE OF STUDS										
30"	28"	26"	25"	24"	2X4 STUDS AND 3/4 SHEATHING	33"	30"	29"	28"	26"
38"	35"	33"	32"	30"	"	42"	38"	36"	35"	33"
45"	42"	39"	38"	36"	"	48"	45"	42"	40"	39"
47"	43"	40"	39"	37"	"	51"	47"	45"	44"	40"
42"	38"	36"	34"	32"	" 1/8	45"	42"	39"	37"	36"
33"	31"	30"	28"	26"	"	36"	33"	31"	30"	30"
52"	48"	46"	44"	42"	"	56"	52"	49"	47"	46"
34"	32"	30"	29"	27"	" 15/8	38"	34"	32"	31"	30"
28"	26"	24"	23"	22"	"	31"	28"	26"	25"	24"
43"	40"	37"	36"	34"	"	48"	43"	41"	38"	37"
SPACING OF TIES FOR SAFE VALUE OF WALES										
33"	29"	27"	25"	24"	DBLE 2X4 WALE 2X4 STUD 3/4 S	36"	33"	30"	28"	27"
27"	24"	22"	21"	20"	" 2X4 " 4X4 "	30"	27"	25"	24"	22"
26"	23"	22"	20"	19"	" 2X4 " 2X6 "	29"	26"	24"	23"	22"
37"	33"	31"	28"	27"	" 3X4 " 3X4 "	40"	37"	34"	32"	31"
51"	46"	42"	40"	37"	" 2X6 " 2X4 "	56"	51"	47"	44"	42"
42"	38"	35"	32"	30"	" 2X6 " 4X4 "	46"	42"	39"	37"	35"
40"	37"	34"	32"	30"	" 2X6 " 2X6 "	45"	40"	38"	36"	34"
43"	40"	37"	34"	32"	" 2X6 " 2X6 " 1-1/8 S	48"	43"	41"	39"	37"
53"	50"	46"	43"	41"	" 3X6 " 2X6 "	60"	53"	51"	49"	46"
39"	35"	32"	30"	28"	" 2X6 " 3X6 "	43"	39"	37"	34"	32"
39"	35"	32"	30"	29"	" 3X4 " 3X4 "	43"	39"	36"	35"	32"
49"	45"	41"	38"	36"	" 3X6 " 3X6 "	54"	49"	46"	43"	41"
48"	43"	40"	37"	35"	" 2X6 " 2X6 " 1-5/8 S	52"	48"	45"	42"	40"
61"	55"	50"	47"	45"	" 3X6 " 2X6 "	65"	61"	57"	53"	50"
43"	38"	35"	33"	31"	" 2X6 " 3X6 "	46"	43"	40"	38"	35"
43"	39"	36"	34"	32"	" 3X4 " 3X4 "	46"	43"	41"	38"	36"
54"	49"	45"	42"	40"	" 3X6 " 3X6 "	58"	54"	50"	48"	45"

THE ABOVE DATA IS BASED ON DEVELOPING THE ALLOWABLE SAFE FIBER STRESS (1800 LBS PER SQ. IN.) GIVING L IN FEET AS MAXIMUM DEFLECTION IN INCHES FOR NO. 1. S4S YELLOW PINE OR EQUIVALENT 30

Dovetail Anchor Slot—Felt Filled

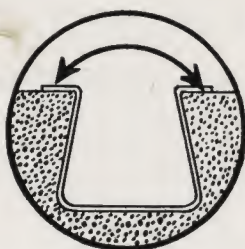
Pat. Nos. 1,548,214; 1,621,877; 1,708,696; 2,075,262; RE 15,979

Especially Adapted for Mechanically Vibrated Concrete Walls

The use of mechanical vibrators has made it virtually impossible to prevent seepage of the cement grout into the standard open face slot. The seepage makes it impossible to insert the anchors without removing the hardened grout, which is an expensive operation.

The felt filler inserted into the standard open face slot, completely fills the slot and absolutely eliminates any possibility of grout seepage.

The Dovetail Anchor Slot is very easily installed and because seepage is prevented by use of Felt Filler, cutting, chipping, digging, cleaning and their attendant high labor costs are entirely eliminated.

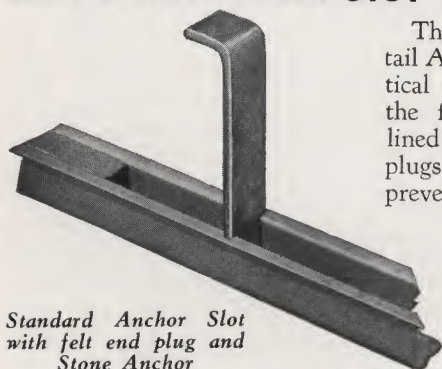


The Dovetail Anchor Slot, both felt filled and standard, with anchors provide a dependable and economical method of anchoring masonry to concrete walls, beams and columns. The Slot, using different anchors, gives the strongest possible anchorage for brick, tile, stone and other material.

The Dovetail Anchor Slot is unique and superior because of its wide flanges running parallel through the face of the concrete. These flanges add so much strength in section that it is impossible for concrete pressure to distort the slot, making it always easy to insert anchors.



Dovetail Anchor Slot—Standard



Standard Anchor Slot
with felt end plug and
Stone Anchor

The Standard Dovetail Anchor Slot is identical to that used with the felt filler as outlined above. Felt end plugs are furnished to prevent end seepage.

For Roofing Reglets

The Standard Dovetail Anchor Slot easily and cheaply serves this purpose more satisfactorily than any other method.

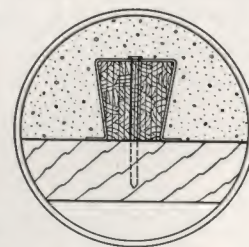
Specifications for Both Types of Slot

Dovetail Anchor Slot is made from both 24 gauge and 22 gauge galvanized stock. The dimensions of the Slot are 1" deep, 1" wide with 11/16" throat. The Slot has apertures spaced 8" on centers for receiving nails.

The Felt Filler for Dovetail Anchor Slot is 3/4" wide by 1" deep.

Application

The Felt Filled or Standard Dovetail Anchor Slot is nailed with the face against the inside of the form as shown in the cross-section at the right.



Removal of Felt Filler

After the forms have been stripped, pull the filler completely out of the Slot, leaving the Slot entirely clean and immediately ready for installation of anchors.

CATALOGUE NUMBERS

Dovetail Anchor Slot with Felt Filler

CATALOGUE NUMBER	GAUGE OF SLOT	WEIGHT PER 1000 FEET
505	24	340 lbs.
506	22	440 lbs.

The Felt Filler is inserted prior to shipment.

Dovetail Anchor Slot—Standard

CATALOGUE NUMBER	GAUGE OF SLOT	WEIGHT PER 1000 FEET
510	24	300 lbs.
511	22	400 lbs.

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Dovetail Anchor Slot and Anchors

Pat. Nos. 1,548,214; and RE 15,979

Masonry Anchor Specifications

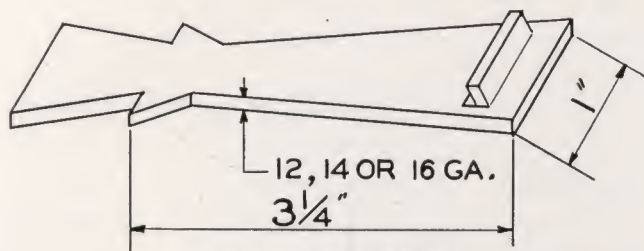
The concrete contractor shall furnish and install Felt Filled Dovetail Anchor Slot as manufactured by the Universal Form Clamp Company, one slot in all concrete columns up to 16" wide and two or more in wider columns and in all beams, spandrels and concrete walls which are to be faced with Brick, Terra Cotta, Stone or other facing material. The maximum spacing of slot shall be 24" on centers. The slot may be placed either vertically or horizon-

tally in order to accommodate the bond of the masonry.

The masonry contractor shall furnish and install sufficient Anchors, manufactured by the Universal Form Clamp Company, to properly secure the facing material or veneer to the concrete in accordance with the recommended procedure given by the various manufacturers' associations.

Dovetail Brick Anchors

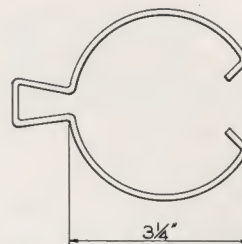
The Metal Brick Anchor



CATALOGUE NUMBERS

CATALOGUE NUMBER	GAUGE	TYPE	WEIGHT PER 1000
516	16	Galvanized	90 lbs.
514	14	Galvanized	110 lbs.
512	12	Galvanized	155 lbs.

The Wire Brick Anchor

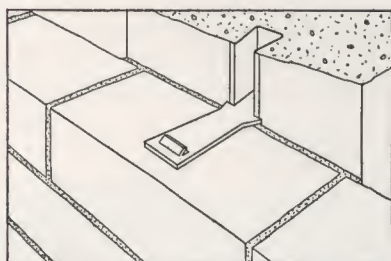


Dovetail Wire Brick Anchors are made of No. 9 Gauge galvanized wire, with hooks at the end to give added bond.

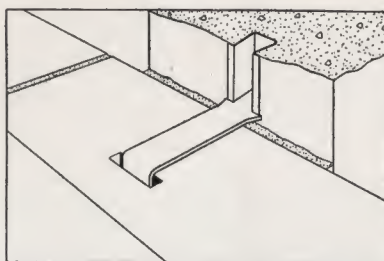
No. 657—Wire Brick Anchor.

Weight, 60 lbs. per 1000.

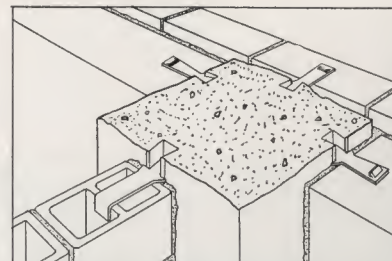
Anchoring with Dovetail Anchor Slot and Anchors



Anchoring Brick to Concrete. With the use of the Continuous Dovetail Anchor Slot, the Anchor can be inserted at any height



Anchoring Stone to Concrete. With the use of the Continuous Dovetail Anchor Slot, the Stone Anchor can also be inserted at any height

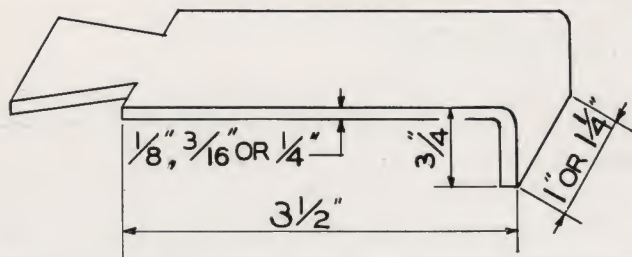


Anchoring to columns with brick facing and tile partition showing the versatility of Dovetail Anchor Slot and Anchors

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Dovetail Stone Anchors

Pat. No. RE 15,979 and 1,548,214



The drawing at the left shows the details of the standard Dovetail Stone Anchors.

Dovetail Stone Anchors can also be furnished in various lengths and widths, straight and bent, in thicknesses from 12 gauge to 1/4" or greater, plain black stock, galvanized stock, galvanized after forming, dipped in asphaltum or red lead, or of copper, brass, bronze, aluminum or other materials to meet any specifications.

When requesting information or prices on special stone anchors, be sure to give quantities, types and all dimensions in accordance with the details as shown for the standard anchors.

CATALOGUE NUMBERS

Plain Black Stock

CATALOGUE NUMBER	SIZE	WEIGHT PER 1000
520	1/8"x1" x3 1/2"	175 lbs.
521	3/16"x1" x3 1/2"	265 lbs.
522	1/4"x1" x3 1/2"	350 lbs.
523	1/4"x1 1/4"x3 1/2"	445 lbs.

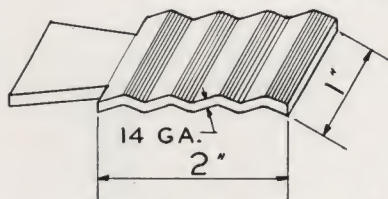
Galvanized After Forming

CATALOGUE NUMBER	SIZE	WEIGHT PER 1000
525	1/8"x1" x3 1/2"	185 lbs.
526	3/16"x1" x3 1/2"	280 lbs.
527	1/4"x1" x3 1/2"	370 lbs.
528	1/4"x1 1/4"x3 1/2"	470 lbs.

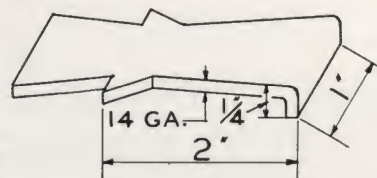
Galvanized Stock

No. 529—1/8" x 1" x 3 1/2"—Weight 175 lbs. per 1000

Dovetail Furring Anchors



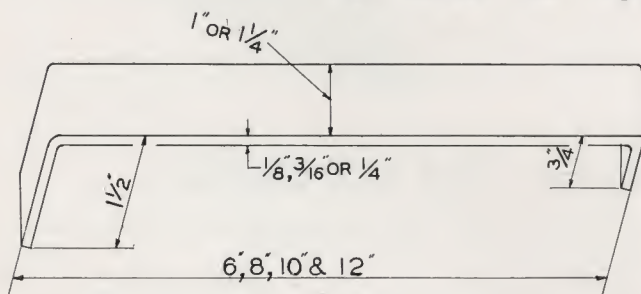
No. 541—Corrugated Furring Anchor. Made of Galvanized Stock. Weight 55 lbs. per 1000.



No. 542—Furring Anchor with hook. Made of Galvanized Stock. Weight 55 lbs. per 1000.

CATALOGUE NUMBERS

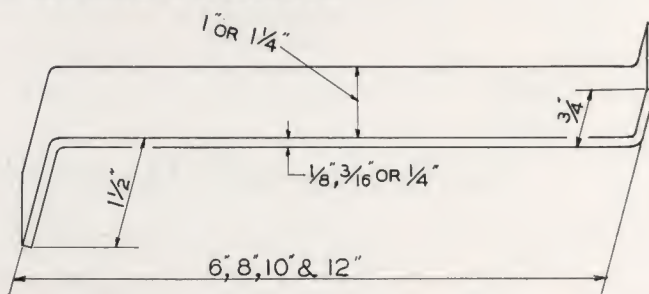
"U" and "Z" Type Stone Anchors



The standard sizes of "U" and "Z" type stone anchors are shown above. Government Specifications call for 1" and 2" hooks.

Standard Anchors are made from plain black stock. These Anchors can be galvanized after forming, dipped in asphaltum or dipped in red lead.

"U" and "Z" type Anchors can also be made of copper, brass, bronze, aluminum or other materials and of various thicknesses, widths and lengths with different sizes of hooks, the hooks punched with nail holes if required.



When requesting information or prices the following information should be given:

Whether Type "U" or Type "Z."

Quantity required of each size and type.

Thickness of stock.

Width of stock.

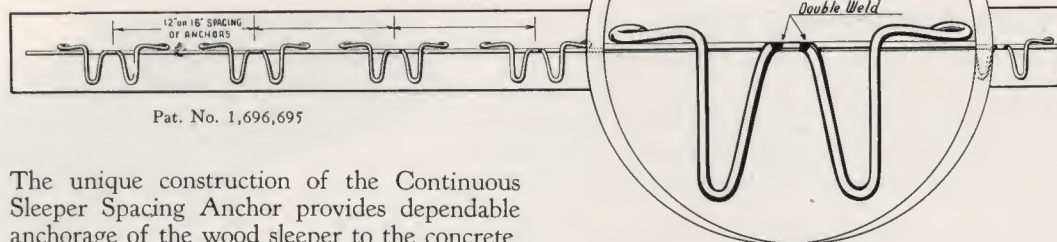
Lengths of Anchors in accordance with the details shown above.

Lengths of Hooks in accordance with the details shown above. Materials of which anchors are to be fabricated.

If holes are required in hooks, give location, size and type of holes required.

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Continuous Sleeper Spacing Anchors



The unique construction of the Continuous Sleeper Spacing Anchor provides dependable anchorage of the wood sleeper to the concrete.

FEATURES

The Continuous Sleeper Spacing Anchor:

1. Simplicity of installation—easily placed in the concrete.
2. Four or five anchors are inserted in one operation.
3. Anchors are accurately spaced.
4. Rigidity and depth of anchor are gauged by the stiff longitudinal wire.
5. Efficient—Economical.

The Anchor:

1. Has two legs projecting into the concrete.
2. Imbedded $1\frac{3}{8}$ " in the concrete—assuring permanent anchorage.
3. Nail holes for securely and permanently anchoring sleepers.
4. Does not interfere with reinforcing steel.

Installation

The Continuous Sleeper Spacing Anchors are easily inserted in the concrete in one operation and are always at right angles to the wood sleeper that will be attached later.

The Continuous Sleeper Spacing Anchors are placed in the proper position on the surface of the rough concrete slab while the concrete is still wet. The Anchors are then forced into the concrete until the longitudinal wire rests

on the concrete slab. This wire acts as a gauge to prevent the anchors from becoming too deeply imbedded.

To install the wood sleeper, the upper legs of the Anchors resting on the longitudinal wire, are pulled up on both sides. The wood sleeper is leveled and then securely anchored by nailing the anchors to the sleepers.

Specifications

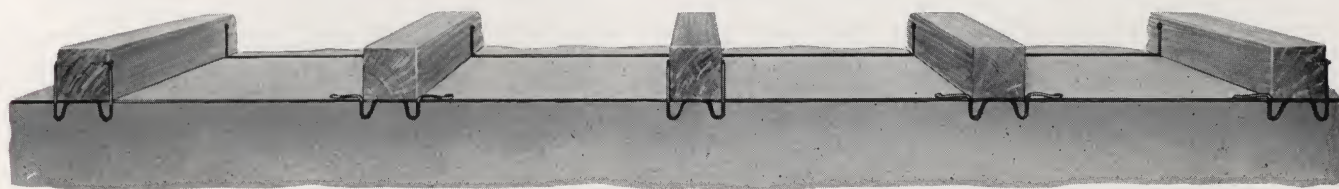
The Continuous Sleeper Spacing Anchor consists of Anchors made of No. 10 galvanized wire and a longitudinal wire made of No. 7 wire. The Anchors are welded to the longitudinal wire at two points.

This Continuous Sleeper Spacing Anchor has $1\frac{3}{8}$ " Anchors projecting into the concrete and Anchors that project $1\frac{1}{4}$ " from the top of the longitudinal wire to the center of the eye used for anchoring the sleeper.

The Continuous Sleeper Spacing Anchor is furnished for 2", 3" and 4" Sleepers, with anchors spaced 12" or 16" on centers. Continuous Sleeper Spacing Anchors for other sizes of sleepers or with special spacings can also be furnished.

CATALOGUE NUMBERS

CAT. NO.	WIDTH OF SLEEPER	SPACING	WEIGHT PER 1000 FEET
672	2"	16" on centers	160 lbs.
673	3"	16" on centers	170 lbs.
674	4"	16" on centers	180 lbs.
Carried in stock in four-foot lengths with four anchors on each length.			
682	2"	12" on centers	170 lbs.
683	3"	12" on centers	180 lbs.
684	4"	12" on centers	190 lbs.
Carried in stock in four-foot lengths with five anchors on each length.			



SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Reed Soffit Clips

*For Steel Beams, Girders and Columns
Absolute Insurance Against Defective Soffits*

REED EXPANSIBLE CLIPS

Only Two Sizes for All Beams and Columns

Two sizes perfectly wrap all flanges from 3" to 16" wide instead of 15 or 20 sizes to sort out and distribute over the job. Clips left over from one job can be used on the next. (Flanges wider than 16" are taken care of by the Reed Rigid Clips described below.)

When the clip is expanded to fit wide flanges it shortens in length and provides more reinforcement per lineal foot. A table of percentage of shortening is available.

Reed Expansible Clips are made of the best grade of No. 12 gauge hard galvanized steel wire, electric-welded in every point.

Reed Expansible Clips to meet Government specifications are made of No. 10 gauge wire in three sizes for flanges from 4" to 8", 8" to 12" and 12" to 16" with clips 8" on center, in 4 foot lengths.

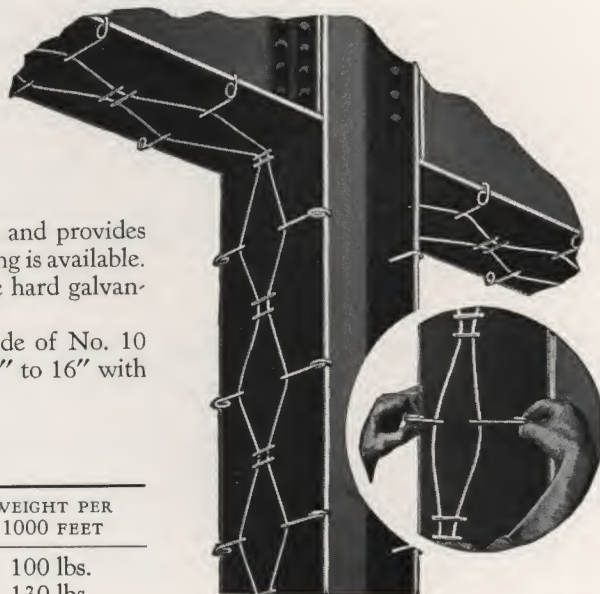
CATALOGUE NUMBERS

CATALOGUE NUMBER	FLANGE WIDTHS	WEIGHT PER 1000 FEET
US 1	4" to 12"	100 lbs.
US 2	12" to 16"	130 lbs.
US 2A	12" to 16"	140 lbs.

US 1 has 2¾" projections, US 2 has 4" projections and US 2A has 6½" projections.

US 1 is furnished in 4 foot lengths.

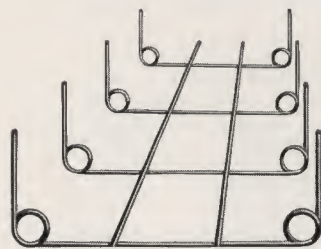
US 2 and US 2A are furnished in 4½ foot lengths.



The convenience in handling the Expansible clip far offsets any small price differential between this material and any other, regardless of size or character.

REED RIGID CLIPS

Provide a Clip for Each Size of Beam



Not only do Reed Rigid Clips cost less per lineal foot of beams wrapped but the placing cost is one-half to one-fourth that of wire mesh and other similar materials. The longitudinal and cross wires are offset 1 inch—placing the reinforcing where it belongs to prevent cracking across the soffit.

The clips are welded rigidly apart on twelve-inch centers. Reed Rigid Clips will not cause voids that are often experienced with other caging materials.

Beam and Column Clip Specifications

Reed Rigid Clips 3" to 8" wide have one longitudinal wire with 2½" projections above loops. Clips 9" to 15" wide have two longitudinal wires with 4" projections above loops. Clips 16" to 20" wide have three longitudinal wires with 5" projections above loops. Clips 21" to 25" wide have four longitudinal wires with 6" projections above loops.

Reed Rigid Clips are made of 12-gauge galvanized wire electrically welded on 12" centers. Furnished for government specifications of 10-gauge galvanized wire spaced 6" on centers. Both types furnished in 5-foot lengths.

Channel Clip Specifications

The application of Reed Channel Clips to large steel channels is as follows: Single Loop Channel Clips are used on channels 3" to 9" deep and have 2½" projection on one side, 16" projection on the other side. Double Loop Channel Clips are used on channels 10" to 18" deep and have 2½" projections on one side and 18" to 24" projections on the other side.

We can also furnish Reed Individual Clips and Haunch Stiffeners.

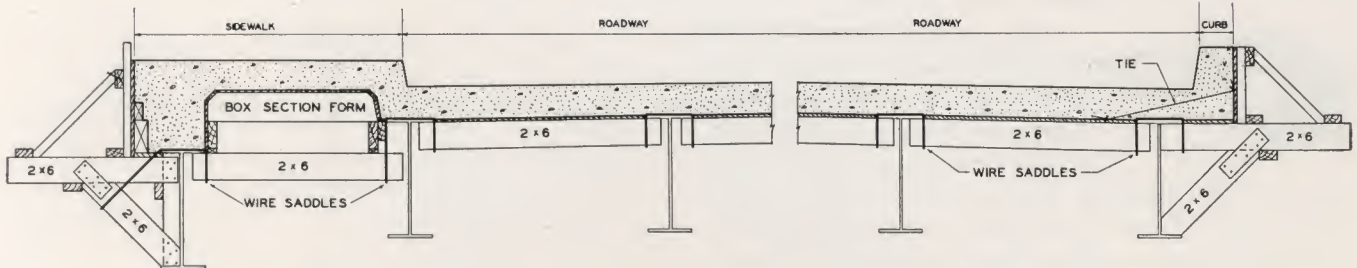
CATALOGUE NUMBERS

CATALOGUE NUMBER	FLANGE WIDTHS	WEIGHT PER 1000 FEET
US 3-8	3" to 8"	120 lbs.
US 9-15	9" to 15"	170 lbs.
US 16-20	16" to 20"	220 lbs.
US 21-25	21" to 25"	250 lbs.
US 38	Channel Clip	180 lbs.

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Wire Beam Saddles

For Hanging Forms from Steel Structures



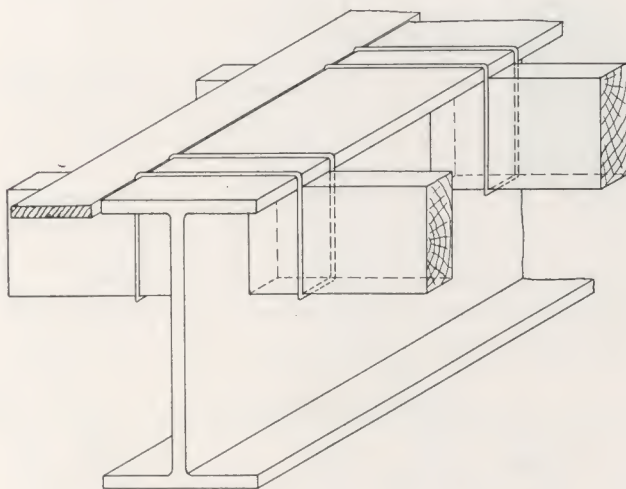
Wire Beam Saddles are adaptable for hanging forms from steel structures where the beams are not fireproofed. They are especially advantageous for bridge deck forming.

Wire Beam Saddles are made of No. 9, No. 8, No. 7, No. 6, and No. 4 bright basic wire and are electrically welded. They are accurately fabricated, maintaining the correct relationship between the deck form and the beam flange.

All Beam Saddles are tagged for size and location from information furnished with the order, or we will furnish special detail sheets for ordering Beam Saddles.

We will gladly furnish, without obligation, estimates and recommendations on receipt of plans and complete information as outlined below.

TO ORDER



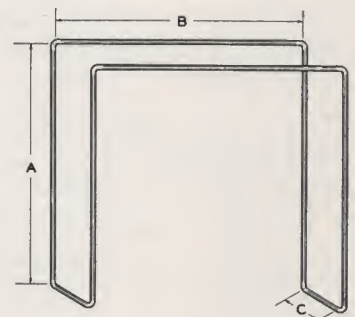
Wire Beam Saddles in place for pouring a concrete slab with beams not fireproofed

For ordering Beam Saddles, or when requesting information or prices, the following information is required:

The Number of the Wire the Saddles are to be made of.

The quantity of each different size.

- A. Dimension from top of Beam to Underside of Lumber.
- B. Flange Widths of Beams.
- C. Width of Joist.



SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Beam Clamps with Band Iron

Pat. Nos. 1,475,424, 1,693,241, 1,835,005

For Hanging Forms from Steel Structures

The Standard Beam Clamp



The Standard Beam Clamp is a metal stamping which hooks over the top flange of a steel beam or girder and clamps the band iron hanger used to suspend the beam forms. It is fabricated of 1 3/4"x12 gauge steel, is ribbed to prevent the hook from straightening and has looped projections through which the band iron hanger is passed and clamped.

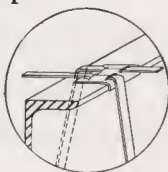
Application

Two Standard Beam Clamps are used with each hanger.

The Band Iron is slipped under the two raised loops. To hold the band iron, the loops are hammered down, giving a double grip which will hold the full strength of the band iron.

The Tandem Beam Clamp

The Tandem Beam Clamp, a metal stamping made from 3"x12 gauge black stock, is used for hanging forms from channel sections as shown in the cut at the right.



The Band Iron

Universal Band Iron, 1/2"x 14 gauge, for use with the Beam Clamps contains an extra carbon content that adds considerably to the tensile strength above that of commercial stock.

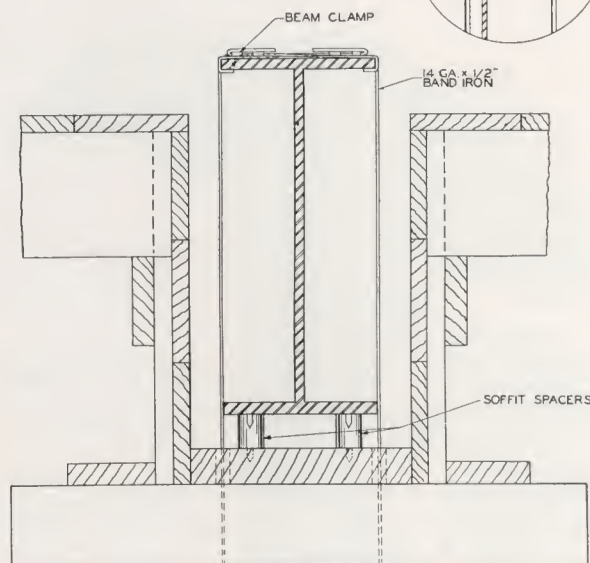
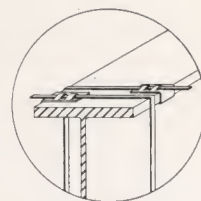
Band Iron is furnished in coils about 95 pounds each. One thousand lineal feet weighs 145 pounds, or 670 feet per 100 pounds.

The Band Tightener

The Band Tightener has a draw of over an inch and is used to pull the forms into line.

CATALOGUE NUMBERS Beam Clamps

CATALOGUE NUMBER	SIZE OF HOOK	WEIGHT PER 1000
381	3/4"	245 lbs.
382	1"	275 lbs.
383	1 1/4"	275 lbs.
384	1 1/2"	315 lbs.
385	1 3/4"	315 lbs.
386	Tandem	215 lbs.
366	1/2"x 14 Gauge Band Iron	95 lbs. per coil
374	Band Tightener	1 1/2 lbs. each



Wooden Cleats can be used with Beam Clamps as shown in the sketch above.

Holes are bored through the beam bottom and the band is brought down along the flange of the I-beam.

It is possible to use single 2x4 cleats flat on a beam bottom where the cleat has only the beam form to support and does not have the additional load of the slab form.

The soffit cleat is canted on the beam soffit so that the band passes under it at right angles to the beam bottom.

SOFFIT SPACERS



The Soffit Spacers are absolutely essential in work where the beam bottoms are suspended from the structural frame.

It takes only an instant to place Soffit Spacers at the desired intervals on the soffit board and the soffit can be drawn up as tight as desired without changing the depth of fireproofing.

The Soffit Spacer is also of decided advantage where the beam bottom is shored from below, as no matter what pressure is put on it, the correct depth of fireproofing is assured.

Soffit Spacers are used to equal advantage on fireproofed steel columns, and for spreaders for narrow wall forms.

All Soffit Spacers are made from 18 gauge black stock.

CATALOGUE NUMBERS

CATALOGUE NUMBER	HEIGHT	WEIGHT PER 1000
407	1 1/2"	40 lbs.
408	2"	55 lbs.
409	3"	80 lbs.

Soffit spacers can be furnished for heights greater than 3".

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Hanging Forms from Steel Structures

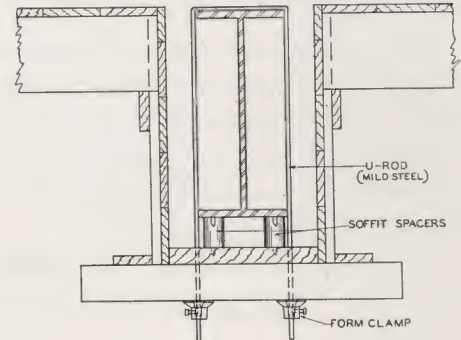
Fireproofed Construction

With Form Clamps and Plain "U" Rods

The method shown in the cut at the right makes use of a mild steel "U" shaped rod with two Form Clamps.

A hanger consisting of a $\frac{1}{2}$ " mild steel "U" rod with two $\frac{1}{2}$ " Form Clamps is good for a recommended working load of 10,000 pounds per hanger.

This method requires a hanger at each beam bottom cleat. The spacing of the hangers and cleats is controlled by the size of soffit lumber used. Even with the usual 2" soffit it is not recommended that the cleats be spaced much over 24" on center.



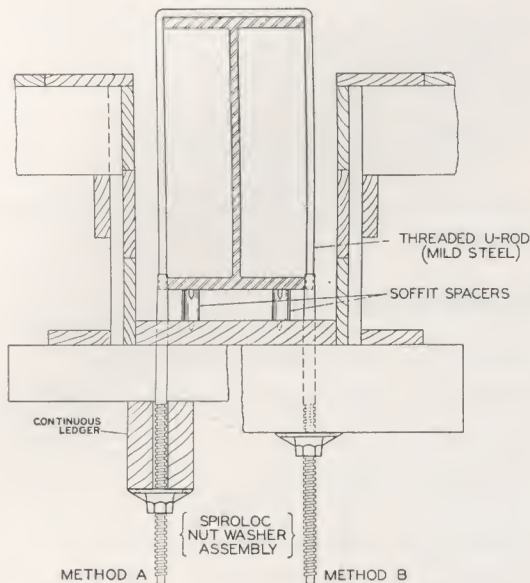
With Spirolocs and Threaded "U" Rods

This method employs a threaded mild steel "U" rod with SPIROLOCS having a recommended working load of 10,000 pounds per hanger. It provides for the easy removal of the forms. The Stud Rod with its long tapered nose permits the necessary breakback, leaves a small neat hole to be grouted and prevents spalling of the concrete.

Method A, shown at the left side of the cut, employs the use of a continuous ledger. The limits of the spacings are controlled by the size of ledger used.

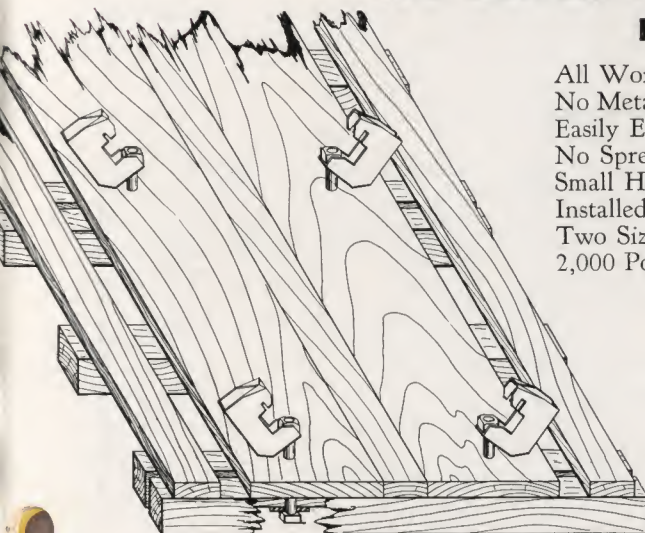
Method B, shown at the right side of the cut, is the same as Method A except that no ledger is used.

This system requires a hanger at each beam bottom cleat. The spacing of the hangers and cleats is controlled by the size of soffit lumber used. Even with the usual 2" soffit it is not recommended that cleats be spaced much over 24" on center.

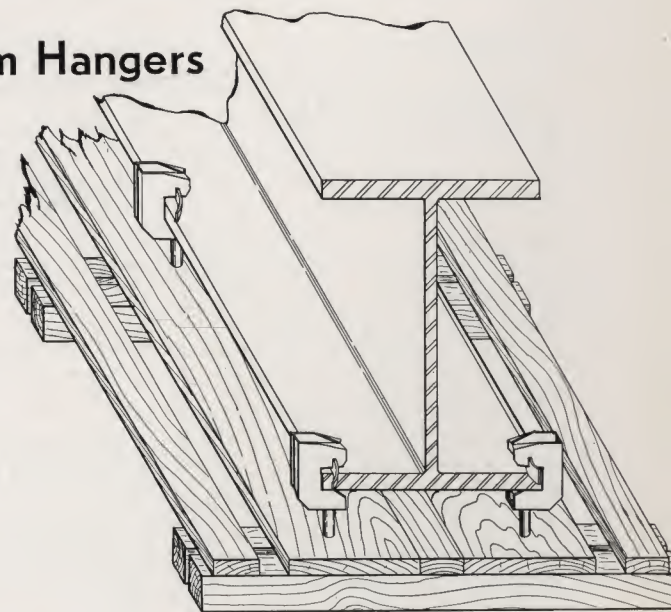


The Bottom Flange Beam Hangers FEATURES

- All Work from Above Beam
- No Metal Exposed
- Easily Erected
- No Spreaders Required
- Small Hole to Grout
- Installed before Erection
- Two Sizes Hangers Only
- 2,000 Pounds Safe Load



Assembled



Erected

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Specifications for Placing Accessories

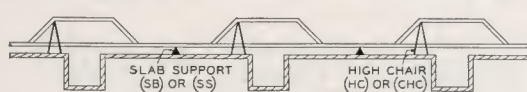
Reprinted from the 1939 Edition of "A Manual of Standard Practice for Reinforced Concrete Construction" published by the Concrete Reinforcing Steel Institute

All reinforcing steel shall be accurately located in the forms, and firmly held in place, before and during the placing of concrete, by means of wire supports adequate to prevent displacement during the course of construction and to keep the steel at a proper distance from the forms.

Bar supports are to be sufficient in number and sufficiently heavy to properly carry the steel they support. The wire sizes and number of supports shall not be less than the following:

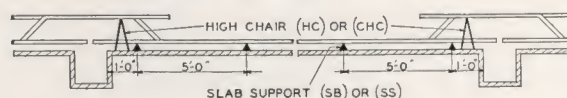
ONE WAY SLAB CONSTRUCTION

Bars continuous over more than one panel



Beam spacing more than 6'-0" use 2 supports.

Bars not continuous



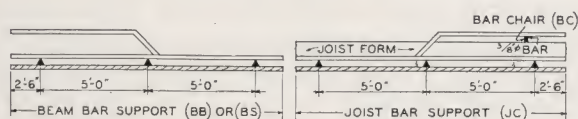
Slab Supports—End Spacing 1'-0" Maximum.
Maximum Intermediate Spacing 5'-0".

Individual High Chairs—(HC)—spaced not more than 4'-0" centers with not less than $\frac{5}{8}$ " support bars. Continuous High Chairs—(CHC)—may be substituted for High Chairs and $\frac{5}{8}$ " support bar.

JOIST-BEAM-GIRDER CONSTRUCTION

Beam and Joist Construction

Beam bars 1 inch square and smaller



Heavy Beam and Girder Construction

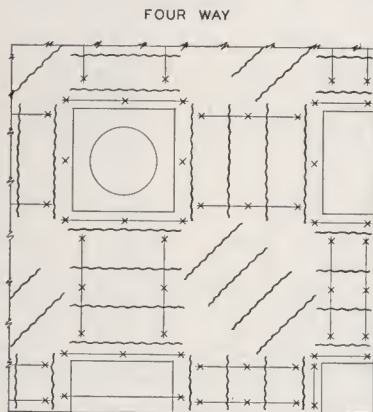
Beam or Girder with bars larger than 1 inch



Maximum end spacing 2'-6"—Maximum intermediate spacing 5'-0" for both lower and upper layers.

To support ends of bent bars in joists, use $\frac{3}{8}$ " round bar at each side of and parallel to supporting beam or wall, held above form by individual chairs—(BC) spaced approximately 25" on centers.

FLAT SLAB CONSTRUCTION



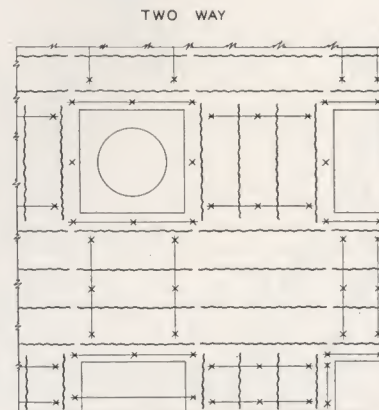
Designates Slab Supports (SB) or (SS).

Designates $\frac{5}{8}$ " Support Bar.

X— Designates High Chairs—(HC).

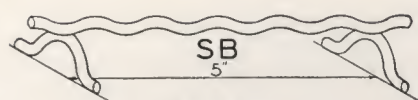
Slab Supports—For spans over 18' 0" use 4 slab supports where 3 are shown on diagram.

Continuous High Chairs—CHC—May be substituted for High Chairs and $\frac{5}{8}$ " support bars.

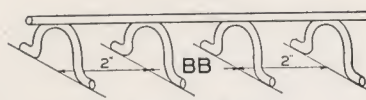


SPECIFY CODE LETTERS OF PRODUCTS WHEN ORDERING

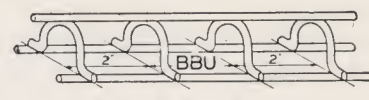
Accessory Specifications and Standard Nomenclature



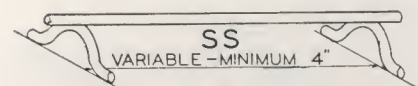
Slab Bolster



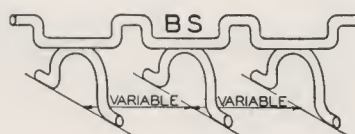
Beam Bolster



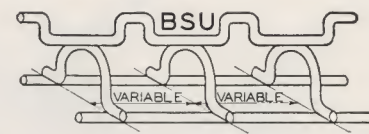
Beam Bolster Upper



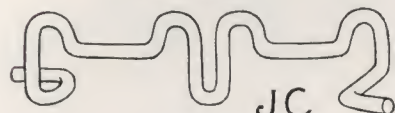
Slab Spacer



Beam Spacer

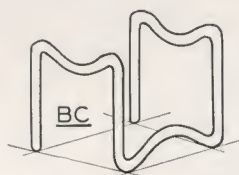


Beam Spacer Upper

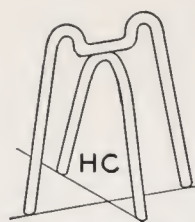


Joist Chair

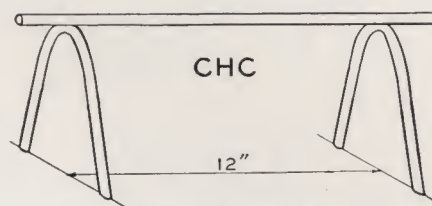
HEAVY BEAM SPACERS (HBS AND HBSU)



Bar Chair



High Chair



Continuous High Chair

Galvanized Legs Furnished, When Required, for Small Additional Charge

ACCESSORY SPECIFICATIONS AND STANDARD NOMENCLATURE

Wire Specifications—Standard Bright Basic Wire. W&M wire gauges indicated in this table are the minimum sizes to be used.

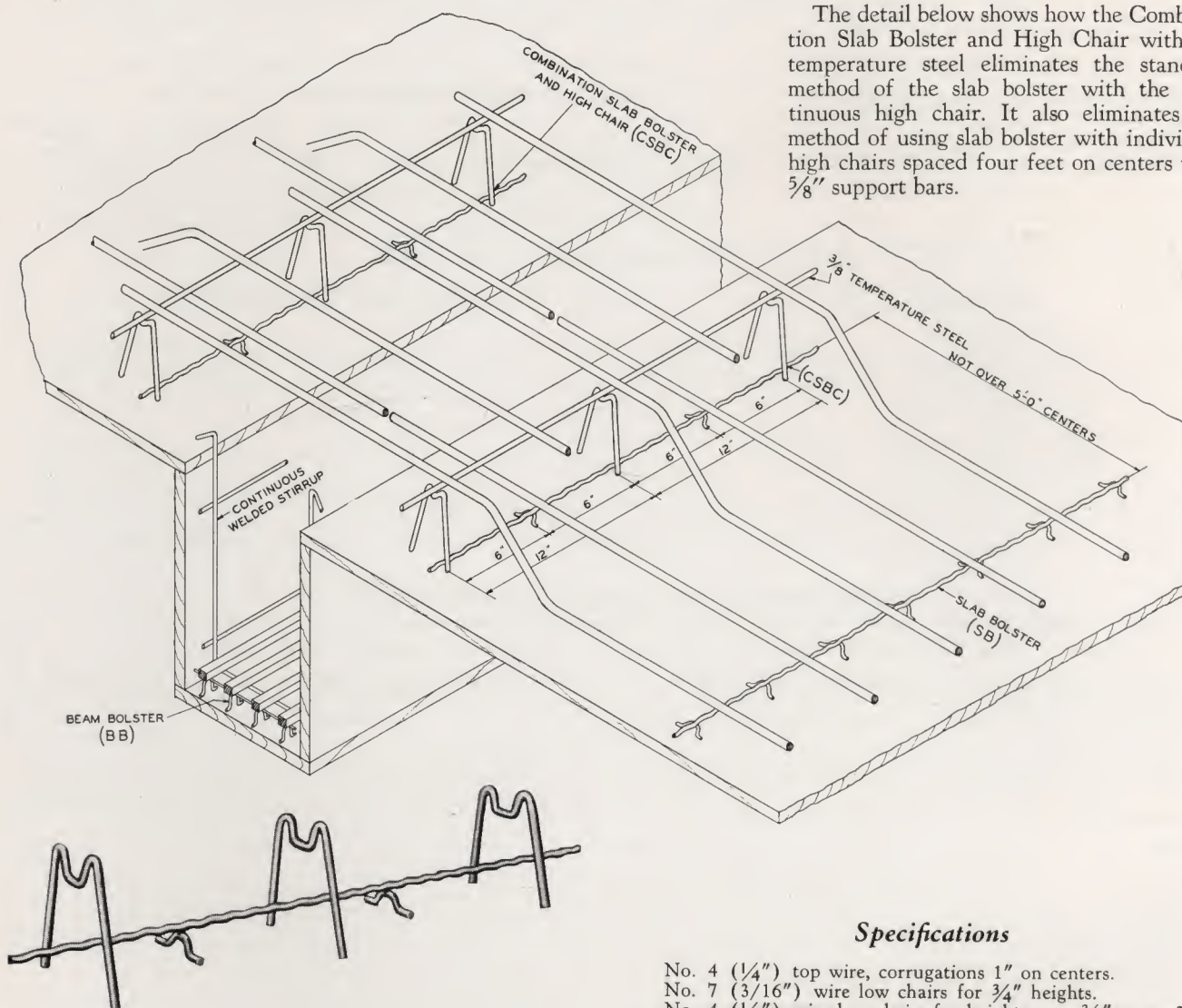
SYMBOL	ACCESSORY	TOP WIRE	LEGS	DESCRIPTION
SB	Slab Bolster	No. 4 Corrugated	$\frac{3}{4}$ " high—No. 7 over $\frac{3}{4}$ "—No. 4	Legs spaced 5" centers—Corrugations vertical or flat spaced 1" centers—Heights up to 2". Stocked in $\frac{3}{4}$", 1", 1½" heights and 5 and 10 foot lengths.
SS	Slab Spacer	No. 5 Smooth	Same as SB	Legs spaced to provide supporting leg under each bar. Minimum leg spacing 4"—Heights up to 2". Fabricated to order.
BB	Beam Bolster	No. 7 Smooth	No. 7	All legs spaced 2" centers—Maximum height 3". Stocked in 1", 1½", 2" heights, in 5 foot lengths.
HBB	Heavy Beam Bolster	No. 4 Smooth	No. 4	Same as BB except maximum height 5".
BBU	Beam Bolster Upper	No. 7 Smooth	No. 7	All legs spaced 2" centers—Maximum height 3". Stocked in 1", 1½", 2" heights, in 5 foot lengths.
HBBU	Heavy Beam Bolster Upper	No. 4 Smooth	No. 4	Fabricated to order. Same as BBU except maximum height 5".
BS	Beam Spacer	No. 7 Smooth	No. 7	Fabricated to order for desired bar spacing and beam width—Maximum height 3".
HBS	Heavy Beam Spacer	No. 4 Smooth	No. 4	Same as BS except maximum height 5".
BSU	Beam Spacer Upper	No. 7 Smooth	No. 7	Fabricated to order for desired bar spacing and beam width—Maximum height 3".
HBSU	Heavy Beam Spacer Upper	No. 4 Smooth	No. 4	Same as BSU except maximum height 5".
JC	Joist Chair	No. 7	No. 7	Made and stocked only in 4, 5, 6 inch widths and $\frac{3}{4}$", 1", 1½" heights.
BC	Bar Chair	No. 7	No. 7	Made and stocked only in $\frac{3}{4}$", 1", 1½" and 2" heights.
HC	Individual High Chairs	See note	See note	No. 5 wire for heights up to 4"; No. 4 wire for heights of 4" up to 6"; No. 0 wire for heights over 6". Stocked in $\frac{1}{4}$" increments from 2¼" to 6".
CHC	Continuous High Chairs	No. 0	No. 0	All legs 12" centers—No. 4 wire legs for heights up to 3". Fabricated to order.

SPECIFY CODE LETTERS OF PRODUCTS WHEN ORDERING

CSBC—Combination Slab Bolster and High Chair

Patent Pending

The detail below shows how the Combination Slab Bolster and High Chair with the temperature steel eliminates the standard method of the slab bolster with the continuous high chair. It also eliminates the method of using slab bolster with individual high chairs spaced four feet on centers with $\frac{5}{8}$ " support bars.



Specifications

- No. 4 ($\frac{1}{4}$ ") top wire, corrugations 1" on centers.
- No. 7 ($\frac{3}{16}$ ") wire low chairs for $\frac{3}{4}$ " heights.
- No. 4 ($\frac{1}{4}$ ") wire low chairs for heights over $\frac{3}{4}$ " up to 2".
- No. 5 ($\frac{7}{32}$ ") wire high chairs for heights up to 4".
- No. 4 ($\frac{1}{4}$ ") wire high chairs for heights from 4" up to 6".
- No. 0 ($\frac{5}{16}$ ") wire high chairs for heights over 6" up to 12".

Low Chairs and High Chairs alternately spaced 6" on centers.

Fabricated to order in 10 foot lengths, in low chair heights from $\frac{3}{4}$ " up to 2"; in high chair heights from 2" to 12". Weight, approximately 300 pounds for 1000 feet with 3" high chair; add 25 pounds per 1000 feet for each additional inch.

When ordering: Specify quantities, code letters and heights of low chairs and high chairs.

Variable leg spacings and lengths can be furnished when required.

The Combination Slab Bolster and High Chair serves the same purpose as the standard slab bolster and high chair. It is used for supporting both the lower and upper layers of reinforcing steel at either side of the beam or adjacent to the wall.

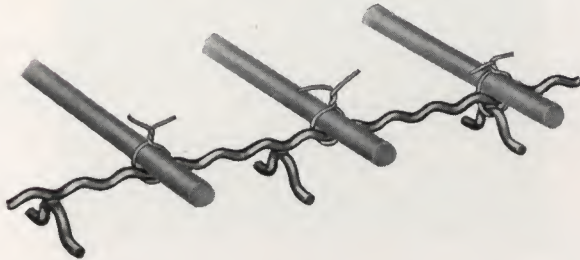
The Combination Slab Bolster and High Chair used for supporting the reinforcing steel substantially reduces the cost and handling of accessories and also reduces the cost of installation due to the fact that it eliminates the erection cost of the $\frac{5}{8}$ " support bars.

The top wire has corrugations 1" apart that act as a spacing guide when setting the steel and also prevents the reinforcing bars from sliding after they are wired.

SPECIFY CODE LETTERS OF PRODUCTS WHEN ORDERING

Slab Bolsters and Spacers

SB—Slab Bolster
(without tie wires)



The Slab Bolster meets every requirement of strength and adaptability. The top wire has corrugations 1" apart that act as a spacing guide when setting the steel and also prevent the reinforcing bars from sliding after they are wired. The legs are electrically welded 5" on centers.

The Slab Bolster is primarily designed to eliminate the inconveniences of pre-spaced supports, enabling the steel setter to cut the bolster to length rather than look for a designated support from a pile of spacers.

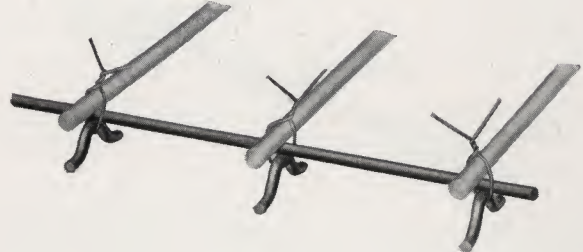
Specifications

- No. 4 (1/4") top wire, corrugations 1" on centers.
- No. 7 (3/16") wire legs, 5" o.c. for 3/4" height.
- No. 4 (1/4") wire legs, 5" o.c. for heights over 3/4" up to 2".

Stocked in 5 foot and 10 foot lengths, in heights of 3/4", 1" and 1 1/2". Made in heights up to 2". Weight, approximately 195 pounds per 1000 feet.

When ordering: Specify quantities, code letters, heights and lengths—whether 5 foot or 10 foot.

SS—Slab Spacer
(without tie wires)



Slab Spacers are fabricated to order from plans or lists. They provide a supporting leg directly under each bar to assure correct spacing of the reinforcing bars.

Specifications

- No. 5 (7/32") smooth top wire.
- No. 7 (3/16") wire legs, for 3/4" height.
- No. 4 (1/4") wire legs, for heights over 3/4" up to 2".

Fabricated to order in lengths not over 10 feet; in heights from 3/4" to 2"; with minimum spacing of 4". Weight approximately 190 pounds per 1000 feet.

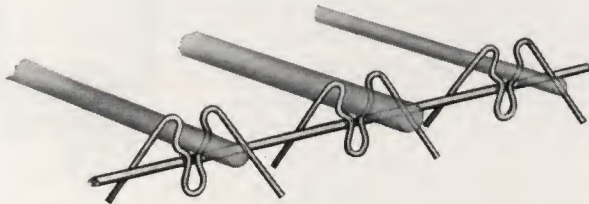
When ordering: Specify quantities, code letters, heights and bar spacings center to center. Our spacer detail sheets should be used to simplify ordering and insure proper fabrication.

All spacers are tagged with markings, heights, spacings and number of bars for each length of spacer.

ST—Spring Type Slab Spacer

Pat. No. 1,850,401

For 3/8" and 1/2" Bars



The Spring Type Slab Spacer provides a chair with a snap-in feature, assuring correct spacing of the reinforcing bars. By snapping the bars in the chairs any possibility of the bars sliding is eliminated.

Specifications

- No. 5 (7/32") longitudinal wire.
- No. 7 (3/16") wire legs, for heights from 3/4" up to 1 1/4".

Fabricated to order in lengths not over 10 feet; in heights from 3/4" to 1 1/4"; with minimum spacing of 4". Weight, approximately 230 pounds per 1000 feet.

When ordering: Specify quantities, code letters, heights and bar spacings center to center. Our spacer detail sheets should be used to simplify ordering and insure proper fabrication.

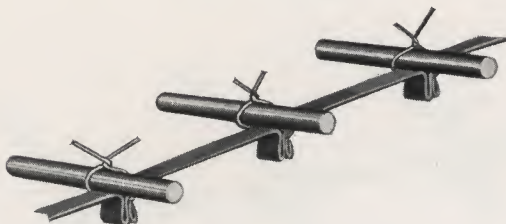
All spacers are tagged with markings, heights, spacings, and number of bars for each length of spacer.

See Pages 30 and 31 for Specifications and Standard Nomenclature

SPECIFY CODE LETTERS OF PRODUCTS WHEN ORDERING

Slab Bolsters and Spacers

MSS—Slab Spacer—Strip Metal (with tie wires)



The Metal Slab Spacer is fabricated to order from plans or lists and provides a supporting leg directly under each bar to assure correct spacing of the reinforcing bars.

Specifications

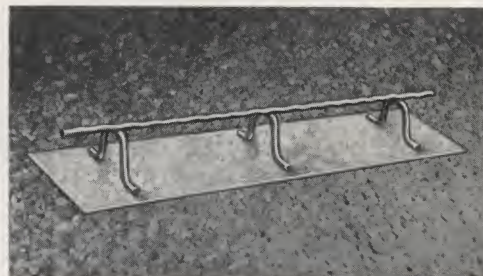
16 gauge steel, $\frac{5}{8}$ " wide for $\frac{3}{4}$ " height.
16 gauge steel, $\frac{3}{4}$ " wide for $\frac{3}{4}$ " and 1" heights.

Fabricated to order in lengths up to 20 feet; in $\frac{3}{4}$ " and 1" heights with minimum spacing of 4". Weight, approximately 225 pounds per 1000 feet $\frac{3}{4}$ " high; 300 pounds per 1000 feet 1" high.

When ordering: Specify quantities, code letters, heights and bar spacings center to center. Our spacer detail sheets should be used to simplify ordering and insure proper fabrication.

All spacers are tagged with markings, heights, spacings and number of bars for each length of spacer.

SBP—Slab Bolster—with Plate (without tie wires)



The Slab Bolster, with a strip metal plate welded to the underside of the legs, is used where cork or other insulation is laid directly on the forms as in packing plants, refrigerator rooms, etc. The metal plate prevents the legs from piercing the insulation and assures proper fireproofing between the insulation and the reinforcing bars.

Specifications

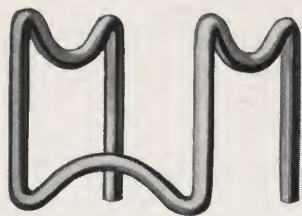
No. 4 ($\frac{1}{4}$ ") top wire, corrugations 1" on center.
No. 7 ($\frac{3}{16}$ ") wire legs, 5" o.c. for $\frac{3}{4}$ " height.
No. 4 ($\frac{1}{4}$ ") wire legs, 5" o.c. for heights over $\frac{3}{4}$ " up to 2".
24 gauge galvanized strip metal plate, $\frac{3}{4}$ " wide.

Fabricated to order in lengths not over 10 feet; in heights from $\frac{3}{4}$ " to 2". Weight, approximately 500 pounds per 1000 feet.

When ordering: Specify quantities, code letters and heights.

Individual Bar Chairs

BC—Bar Chair—Wire



The Individual Bar Chairs, both wire and metal, are spaced not more than 4 feet on centers in both directions to adequately support the reinforcing bars. They are also used for supporting temperature steel over joist forms.

The Metal Bar Chairs can be furnished with nail holes, when required, for holding the reinforcing steel away from the wall forms.

Specifications

No. 7 ($\frac{3}{16}$ ") wire.
Stock heights: $\frac{3}{4}$ ", 1", $1\frac{1}{2}$ " and 2".
Packed 500 in a carton. Weight, approximately 75 pounds per 1000.

When ordering: Specify quantities, code letters and heights.

MBC—Bar Chair—Metal



Specifications

18 gauge steel, $1\frac{1}{2}$ " wide.
Stock heights: $\frac{3}{4}$ ", 1", $1\frac{1}{2}$ " and 2".
Packed in any quantity. Weight, approximately 90 pounds per 1000.

When ordering: Specify quantities, code letters and heights.

See Pages 30 and 31 for Specifications and Standard Nomenclature

SPECIFY CODE LETTERS OF PRODUCTS WHEN ORDERING

Beam Bolsters and Spacers

BEAM BOLSTERS—STANDARD

BB—For Lower Layer of Bars

BBU—For Upper Layer of Bars

The Beam Bolsters for both the upper and lower layers of steel support the bars regardless of the spacing. They are primarily designed to eliminate the inconveniences of pre-spaced supports, enabling the steel setter to cut the bolster to beam widths on the job rather than look for a designated support from a pile of spacers.

The Beam Bolster for the upper layer of bars has two wires welded to the underside of the legs allowing the bolster to act as a separator.

BEAM BOLSTERS—HEAVY

HBB—For Lower Layer of Bars

HBBU—For Upper Layer of Bars

The Heavy Beam Bolster is fabricated in the same manner and serves the same purpose as the standard Beam Bolster. It is primarily used for supporting the bars in heavy beam and girder construction with bars larger than 1".

Specifications

Beam Bolster—Standard

BB —No. 7 (3/16") wire throughout with legs 2" o. c.

BBU—No. 7 (3/16") top wire and legs.

No. 9 (5/32") wire underside of legs.

Stocked in 5 foot lengths; in heights of 1", 1 1/2" and 2"; maximum height 3". Weight, approximately 250 pounds per 1000 feet of BB; 425 pounds per 1000 feet of BBU.

When ordering: Specify quantities, code letters and heights.

Specifications

Beam Bolster—Heavy

HBB —No. 4 (1/4") wire throughout.

HBBU—No. 4 (1/4") top wire and legs.

No. 9 (5/32") wire underside of legs.

Stocked in 5 foot lengths; in heights of 1 1/2" and 2"; maximum height 5". Weight, approximately 400 pounds for 1000 feet of HBB; 565 pounds for 1000 feet of HBBU.

When ordering: Specify quantities, code letters and heights.

BEAM SPACER—STANDARD

BS—For Lower Layer of Steel

BSU—For Upper Layer of Steel

Beam Spacers, for both the upper and lower layers of steel, provide a deep seat for each bar. Under the center of each bar a strong leg is electrically welded. This leg is wide enough to prevent tipping.

The Beam Spacer for the upper layer of bars has two wires welded to the underside of the legs, allowing the spacer to act as a separator.

BEAM SPACER—HEAVY

HBS—For Lower Layer of Bars

HBSU—For Upper Layer of Bars

The Heavy Beam Spacer is fabricated in the same manner and serves the same purpose as the standard Beam Spacer. It is primarily used for supporting the bars in heavy beam and girder construction with bars larger than 1".

Specifications

Beam Spacer—Standard

BS —No. 7 (3/16") wire throughout.

BSU—No. 7 (3/16") top wire and legs.

No. 9 (5/32") wire underside of legs.

Fabricated to order in lengths up to 5 feet and in heights from 1" to 3". Minimum spacing 1 3/4". End spacing 1 7/8".

Weight, approximately 200 pounds per 1000 feet of BS; 300 pounds per 1000 feet of BSU.

When ordering: Specify quantities, code letters, sizes of bars, spacings center to center, heights and end spacings. Our spacer detail sheets should be used to simplify ordering and insure proper fabrication.

All spacers are tagged with markings, heights, spacings, and number of bars for each length of spacer.

Specifications

Beam Spacer—Heavy

HBS —No. 4 (1/4") wire throughout.

HBSU—No. 4 (1/4") top wire and legs.

No. 9 (5/32") wire underside of legs.

Fabricated to order in lengths up to 5 feet; in heights from 1" to 5". Minimum spacing 1 3/4". End spacing 1 7/8".

Weight, approximately 400 pounds for 1000 feet of HBS; 585 pounds for 1000 feet of HBSU.

When ordering: Specify quantities, code letters, sizes of bars, spacings center to center, heights and end spacings. Our spacer detail sheets should be used to simplify ordering and insure proper fabrication.

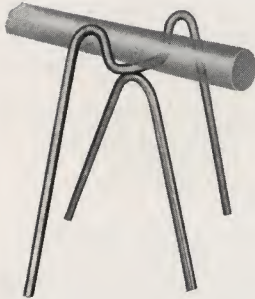
All spacers are tagged with markings, heights, spacings and number of bars for each length of spacer.

SPECIFY CODE LETTERS OF PRODUCTS WHEN ORDERING

Individual High Chairs

For supporting the top layer of steel in combination with a support bar

HC—High Chair—Wire



The Wire High Chair is a firm non-collapsible chair made of a saddle and a supporting leg welded into a unit providing a bar seat with unusual strength.

Specifications

No. 5 (7/32") wire for chairs 2" to 4" high.

No. 4 (1/4") wire for chairs 4" to 6" high.

No. 0 (5/16") wire for chairs over 6" up to 20" high.

No. 4 (1/4") cross wires, 6" from bottom, for chairs from 12" to 20" high.

Stocked in 1/4" increments from 2 1/4" up to 6".

Weight, approximately 190 pounds for 1000 chairs 3" high; 260 pounds for 1000 chairs 4" high; for each additional inch up to 6" add 50 pounds per 1000; 725 pounds for 1000 chairs 7" high, for each additional inch add 100 pounds per 1000.

When ordering: Specify quantities, code letters and heights to bar seat.

MHC—High Chair—Metal

The Metal High Chair is a firm, non-collapsible chair made from strip metal with a base flanged to give a bearing of more than 1/2" to each side. Notches in the flanges permit nailing the chair to the forms.



Specifications

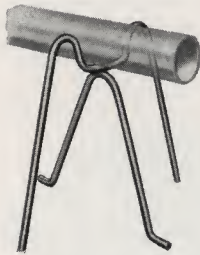
18 gauge steel, 4" wide.

Made in heights from 2" to 12"; fabricated to order; weight, approximately 230 pounds for 1000 chairs 3" high. For each additional inch add 56 pounds.

When ordering: Specify quantities, code letters and heights to bar seat.

Screed Chairs

SC—Screed Chair—Wire



The Wire Screed Chair is fabricated to use a 1" pipe screed with a 1-5/16" outside diameter. It is made of a saddle and a supporting leg. The supporting legs are bent at right angles and flattened providing flat feet for nailing the chairs to the forms. The Screed Chair remains in the concrete, but the pipe screed is removed and reused.

Specifications are the same as for the HC High Chairs shown above.

When ordering: Specify quantities, code letters, heights of chairs to underside of screed pipe; or specify thickness of slab and outside diameter of screed pipe.

MSC—Screed Chair—Metal

The Metal Screed Chair is fabricated with notches to hold a 5/16" by 1 1/2" or 2" steel screed bar. Because of the depth of the screed, no deflection occurs when three chairs are used for a 14 foot bar. The Screed Chairs have notches in their flanged base to provide for nailing the chairs to the forms. Metal Screed Chairs can also be fabricated to use a standard 1" pipe screed with a 1-5/16" outside diameter.

Specifications are the same as for the MHC High Chair shown above.

When ordering: Specify quantities, code letters, heights of chair to underside of screed pipe or bar; or specify the thickness of the slab and the size of screed bar or outside diameter of screed pipe.



SHC—Special High Chair

To Rest on Lower Bars or Subgrade

The Special High Chair, with laced legs, is used to support the upper layer of bars with the cross wires resting on the lower layer of steel. It is also used to support bars off the subgrade.

The Special High Chair is made of a saddle and a supporting leg with cross wires projecting 4" beyond the legs. The cross wires are 1" above the ends of the chair which prevents the chair from sliding.

Specifications

No. 5 (7/32") wire for chairs from 2" to 4" high.

No. 4 (1/4") wire for chairs from 4" to 6" high.

No. 4 (1/4") cross wires for chairs from 2" to 6" high.

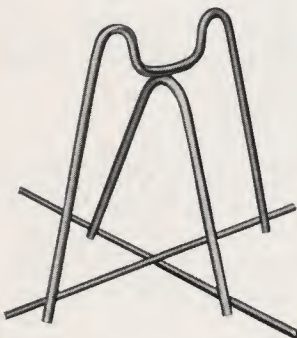
No. 0 (5/16") wire for chairs over 6" up to 20" high.

No. 0 (5/16") cross wires for chairs over 6" up to 20" high.

Fabricated to order. Weight, approximately 300 pounds for 1000 chairs 3" high; 400 pounds for 1000 chairs 4" high; for each additional inch up to 6" add 75 pounds per 1000 chairs; 1100 pounds for 1000 chairs 7" high, for each additional inch add 150 pounds per 1000 chairs.

When ordering: Specify quantities, code letters and heights.

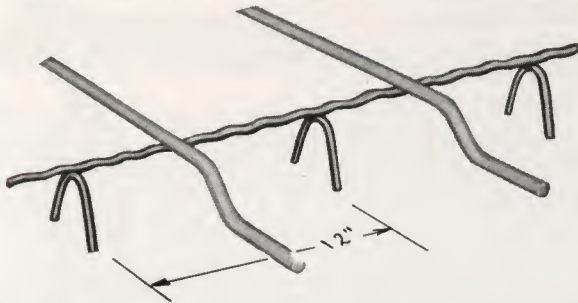
See Pages 30 and 31 for Specifications and Standard Nomenclature



SPECIFY CODE LETTERS OF PRODUCTS WHEN ORDERING

Continuous High Chairs

CHC—Continuous High Chair—Standard



The Continuous High Chair eliminates the use of support bars and individual high chairs, advantageously supporting and securely holding in position the bent bars at the top of the slab. The corrugations in the top wire prevent the reinforcing bars from sliding after they are wired.

The Continuous High Chair is used at each side of the concrete beams, over structural framing, around column heads, to support negative top steel in flat slab construction, and to support top steel in highway bridge slabs.

Specifications

No. 0 (5/16") top wire—corrugated.

No. 4 (1/4") wire legs for heights from 2" up to 3".

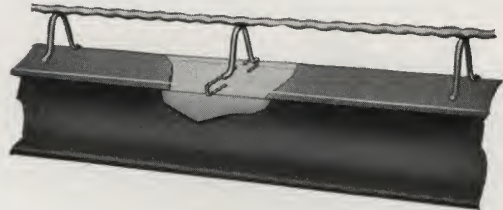
No. 0 (5/16") wire legs for heights over 3" up to 12".

Fabricated to order in 10 foot lengths; in 1/4" increments from 2" to 12" high; legs are spaced 12" on centers. Weight, approximately 350 pounds for 1000 feet 3" high; 450 pounds for 1000 feet 4" high, for each additional inch add 35 pounds per 1000 feet.

When ordering: Specify quantities, code letters and heights.

The Continuous High Chair can also be furnished in even foot lengths up to 10 feet and with legs spaced closer than 12" on center.

CHCA—Continuous High Chair—With Clips



The Continuous High Chair with clips is especially designed to support mesh or reinforcing over structural steel. Two pieces of wire 6 1/2" long are welded at the bottom of alternate legs. The wires are easily bent over the flanges of the structural beams securely locking the Continuous High Chair to the beam, thereby preventing displacement. The corrugations in the top wire prevent the reinforcing bars from sliding after they are wired.

Specifications

No. 0 (5/16") top wire—corrugated.

No. 4 (1/4") wire legs for heights from 2" up to 3".

No. 0 (5/16") wire legs for heights over 3" up to 12".

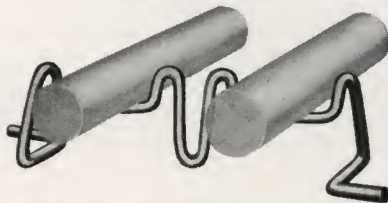
No. 9 (5/32") wire, 6 1/2" long welded to the legs.

Fabricated to order in 5 foot lengths, with 3 sets of clips on each 5 foot length; in 1/4" increments from 2" to 12" high; legs spaced 12" on centers. Weight, approximately 370 pounds for 1000 feet 3" high; 470 pounds for 1000 feet 4" high; for each additional inch add 35 pounds per 1000 feet.

When ordering: Specify quantities, code letters and heights.

Joist Chairs

JC—Joist Chair—Wire
Pat. No. 1,841,720



The Wire Joist Chair provides bar seats that are continuous without any opening, with legs formed in opposite directions assuring stability.

The double wire leg support at the center, between the bars, provides unusual strength. The legs resting on the joist bottom are so formed that they prevent the spacers from slipping between the pan and the soffit.

Specifications

No. 7 (3/8") wire throughout.

Stocked in 4", 5" and 6" widths and 3/4", 1" and 1 1/2" heights.

Packed 500 in a carton. Weight, approximately 90 lbs. per 1000.

When ordering: Specify quantities, code letters, widths and heights.

JA—Joist Chair—Metal



The Metal Joist Chair provides bar seats that are continuous without any openings. The Joist Chairs are made from strip metal, providing stable leg supports. The bar seats are high enough to allow the concrete to flow freely underneath.

Specifications

14 gauge steel, 1" wide.

Stocked in 4", 5" and 6" widths and 3/4", 1" and 1 1/2" heights.

Packed in any quantity. Weight, approximately 225 pounds per 1000 pieces.

When ordering: Specify quantities, code letters, widths and heights.

See Pages 30 and 31 for Specifications and Standard Nomenclature

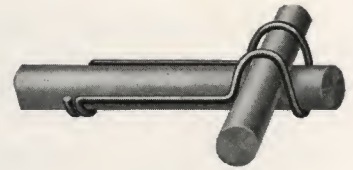
SPECIFY CODE LETTERS OF PRODUCTS WHEN ORDERING

Plain Bar Ties



Plain Bar Ties are made from high carbon spring steel.

They are used for tying bars in mats for concrete roads as well as for tying horizontal and vertical reinforcing steel in retaining walls, piers, abutments and other types of reinforced concrete construction.



Catalogue Numbers and Sizes

No broken lots will be shipped

No. 620—For tying two intersecting bars as follows:
 $\frac{1}{4}'' \times \frac{1}{4}'' - \frac{1}{4}'' \times \frac{3}{8}'' - \frac{3}{8}'' \times \frac{3}{8}''$.
 Packed 2000 to a box, weight 17 lbs. per 1000.

No. 621—For tying two intersecting bars, the combined diameter of which is not greater than 1", as follows:
 $\frac{3}{8}'' \times \frac{1}{4}'' - \frac{3}{8}'' \times \frac{3}{8}'' - \frac{1}{2}'' \times \frac{1}{4}''$
 $\frac{1}{2}'' \times \frac{3}{8}'' - \frac{1}{2}'' \times \frac{1}{2}''$
 Packed 1000 to a box, weight 25 lbs. per 1000.

No. 622—For tying two intersecting bars, the combined diameter of which is not less than 1", not greater than $1\frac{3}{8}''$, as follows:

$\frac{1}{2}'' \times \frac{1}{2}'' - \frac{5}{8}'' \times \frac{3}{8}'' - \frac{5}{8}'' \times \frac{1}{2}'' -$
 $\frac{5}{8}'' \times \frac{5}{8}'' - \frac{3}{4}'' \times \frac{1}{4}'' - \frac{3}{4}'' \times \frac{3}{8}'' -$
 $\frac{3}{4}'' \times \frac{1}{2}'' - \frac{3}{4}'' \times \frac{5}{8}''$

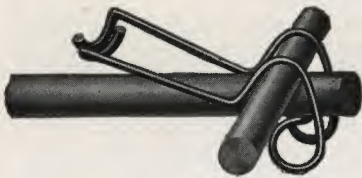
Packed 1000 to a box, weight 38 lbs. per 1000.

No. 623—For tying two intersecting bars, the combined diameter of which is not less than $1\frac{1}{4}''$, not greater than $1\frac{5}{8}''$, as follows:

$\frac{3}{4}'' \times \frac{1}{2}'' - \frac{3}{4}'' \times \frac{5}{8}'' - \frac{3}{4}'' \times \frac{3}{4}'' -$
 $\frac{7}{8}'' \times \frac{3}{8}'' - \frac{7}{8}'' \times \frac{1}{2}'' - \frac{7}{8}'' \times \frac{5}{8}'' -$
 $\frac{7}{8}'' \times \frac{3}{4}'' - 1'' \times \frac{3}{8}'' - 1'' \times \frac{1}{2}'' -$
 $1'' \times \frac{5}{8}''$

Packed 1000 to a box, weight 65 lbs. per 1000.

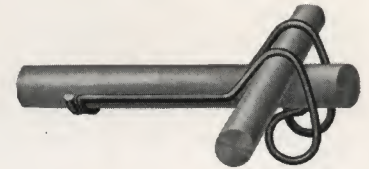
Tie Chairs



Tie Chairs are made from high carbon spring steel.

They are so constructed that they both tie and support two intersecting bars above the forms.

Both sizes of Tie Chairs support the bars $\frac{3}{4}''$ above the forms.



Catalogue Numbers and Sizes

No broken lots will be shipped

No. 631—For tying and supporting two intersecting bars, the combined diameter of which is not greater than 1", as follows:

$\frac{1}{2}'' \times \frac{1}{4}'' - \frac{1}{2}'' \times \frac{3}{8}'' - \frac{1}{2}'' \times \frac{1}{2}''$
 $\frac{5}{8}'' \times \frac{1}{4}'' - \frac{5}{8}'' \times \frac{3}{8}'' - \frac{3}{4}'' \times \frac{1}{4}''$

Packed 500 in a box, weight 80 lbs. per 1000.

No. 632—For tying and supporting two intersecting bars, the combined diameter of which is not less than $1\frac{1}{8}''$, not greater than $1\frac{3}{8}''$ as follows:

$\frac{5}{8}'' \times \frac{1}{2}'' - \frac{5}{8}'' \times \frac{5}{8}'' - \frac{3}{4}'' \times \frac{3}{8}'' - \frac{3}{4}'' \times \frac{1}{2}''$
 $\frac{3}{4}'' \times \frac{5}{8}'' - \frac{7}{8}'' \times \frac{3}{8}'' - \frac{7}{8}'' \times \frac{1}{2}'' - 1'' \times \frac{3}{8}''$

Packed 500 in a box, weight 100 lbs. per 1000.

Reinforcing Fabricators Stock Items

Bar supports can be conveniently carried in steel fabricators' stock. Slab and beam bolsters are shipped to the job in stock lengths, therefore, there is no necessity for marking plans or tagging supports for definite locations in the structure. The steel setter prefers to cut these to required lengths on the job rather than look for a designated support from a pile of bar spacers.

A stock of the following items will answer requirements for immediate delivery:

Slab Bar Bolsters—Beam Bar Bolsters—Upper Beam

Bar Bolsters—Joist Bar Spacers—Individual Bar Chairs—Individual High Chairs.

Legs for Federal Housing Specifications



Federal Housing Specifications call for the special type of legs as illustrated. We can furnish this type of leg at no additional cost.

When spacers are required with special galvanized legs for Federal Housing Specifications, it should be so specified on your orders so that proper materials will be fabricated.

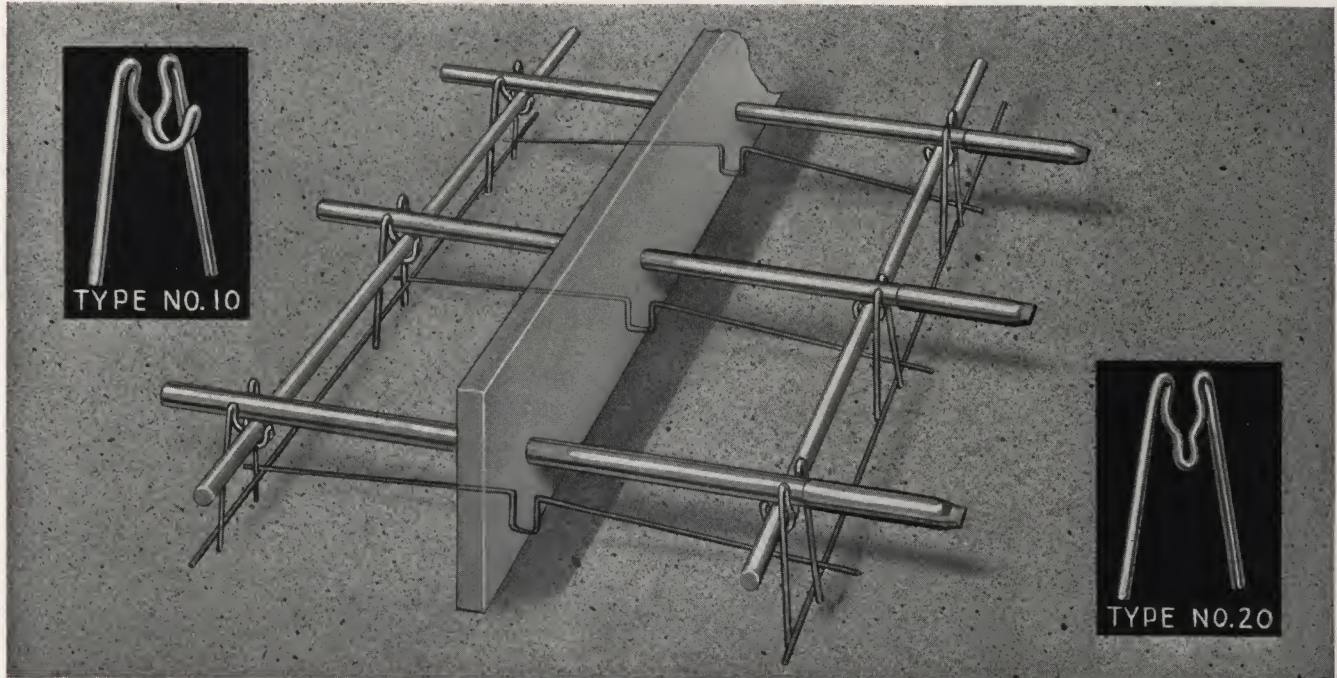
SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

Continuous Spacer and Support

Pat. No. 2,133,553

For Dowel Bar Assemblies

For Supporting and Spacing the Dowel Bars at the Expansion Joints



UNIVERSAL has two types of Continuous Spacer and Support for Dowel Bar Assemblies, to meet various State Highway Department Specifications.

Type No. 10, as illustrated above, provides a snap-in dowel chair with a lip to seat the spacer or load distribution bar and also to securely lock each end of the dowel bar assuring accurate alignment of the dowels in relation to the expansion joint.

Type No. 20, as illustrated above, is the same type as Type No. 10, except that it does not have the lip for the spacer or load distribution bar.

The Assemblies are fabricated to support dowels at variable spacings, for variable heights from the subgrade to the center of

the dowel bar and in variable assembly widths. Both types of assemblies have recessed cross wires for supporting and aligning the expansion joint.

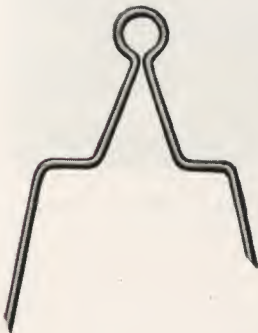
Continuous sand plates are available to be placed under the assemblies for supporting them evenly in loose sand.

Specifications

- No. 5 ($\frac{7}{32}$ " wire, snap-in dowel chairs.
- No. 5 ($\frac{7}{32}$ " longitudinal wires.
- No. 5 ($\frac{7}{32}$ " recessed cross wires.

When ordering: Our detail sheets should be used to simplify ordering and insure proper fabrication.

DC—Individual Dowel Chair



The Individual Dowel Chair is a two-legged chair used where the height from the center of the dowel bar to the subgrade is not over 4". The dowel is slipped through the eye in the chair, preventing the dowel from being forced up or down during pouring. The shouldered sections act as stops resting on the subgrade and insure proper dowel height.

The Dowel Chair is fabricated with one leg $4\frac{1}{4}$ " long from the stop to the end, the other leg is $2\frac{1}{2}$ " long from the stop to the end. The legs are pointed so that they can be easily forced into the subgrade. The long leg securely holds the chair to

correct height while the short leg keeps the chair from turning, thereby holding the dowel in true position.

Specifications

No. 5 ($\frac{7}{32}$ " wire throughout for heights from $2\frac{1}{2}$ " up to 4".

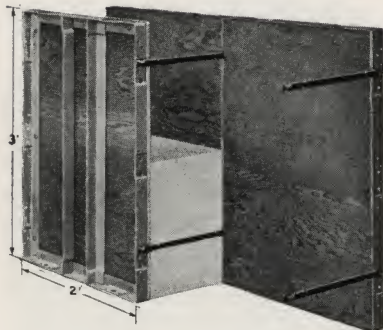
Fabricated to order. Weight, approximately 200 pounds for 1000.

When ordering: Specify quantities, code letters and heights from subgrade to center of dowel bar.

SPECIFY CODE LETTERS OF PRODUCTS WHEN ORDERING

Uni-Forms

For All Types of Concrete Construction



Uni-Forms and Uni-Form Ties completely erected with Concrete in place

Uni-Forms are a complete forming unit comprised of a face that may be replaced at a small cost and a supporting frame that will last indefinitely.

The Uni-Form:

1. A steel frame—special carbon content.
2. A plywood face—hot press process.
3. Standard size—2'x3'.
4. Readily handled—Weight 40 lbs.

The Uni-Form Tie:

1. $\frac{3}{4}$ " by 13 Ga. Special Band Iron—3000 lb. working load.
2. A spreader—eliminates wooden spreaders.
3. A lock—assembles Uni-Forms.
4. Breaks back—depth $\frac{1}{2}$ " from wall face.
5. Leaves a small hole for pointing.
6. Stamped for correct wall width.

Uni-Form Accessories:

1. Minimum of parts required for form erection.
2. Scaffold bracket eliminates staging—brackets attach to forms.

The Uni-Form System:

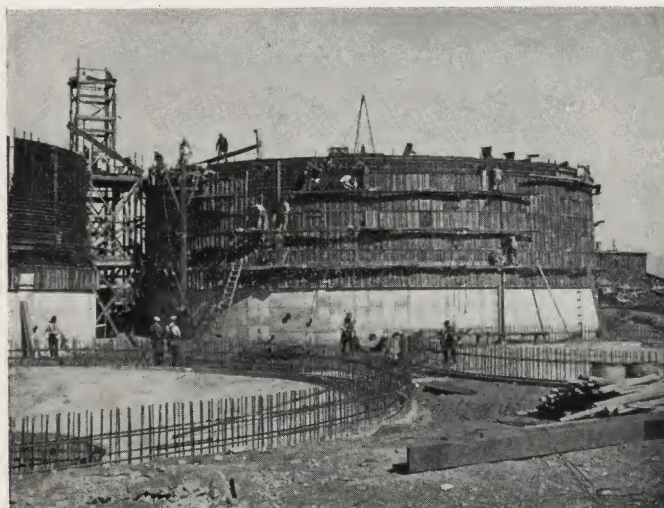
1. Uni-Forms assembled with the Ties are the Forms.
2. Units have no top or bottom, right or left and member both horizontally and vertically.
3. Have advantages of mechanical assembly and provide nailing surface of wood forms.
4. Provide tight forms—straight walls—smooth faces.

Results:

Save time and money.

1. Lower material costs.
2. Lower labor costs.
3. Better work.
4. Better co-ordinated job.

Strong enough for heaviest Engineering Work



Sewage Disposal Plant, Denver, Colorado

Light enough for smallest House Foundation



Residence Foundation, Chicago, Illinois

Uni-Forms Are Rented as Well as Sold

Send for our catalogue fully illustrating and describing Uni-Forms

SPECIFY CATALOGUE NUMBERS OF PRODUCTS WHEN ORDERING

